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China Report

ECONOMIC AFFAIRS

ENERGY: STATUS AND DEVELOPMENT--56

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25 MARCH 1987

CHINA REPORT
ECONOMIC AFFAIRS

ENERGY: STATUS AND DEVELOPMENT--56

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NATIONAL POLICY

ENERGY OUTPUT INCREASES ACROSS BOARD IN 1986

OW311220 Beijing XINHUA in English 1029 GMT 31 Dec 86

[Text] Beijing, 31 Dec (XINHUA)--The year 1986 has witnessed all-round growth in China's coal, electricity, and oil production, according to initial statistics provided by several ministries.

In fact, it is one of the best years for energy production in China, the ministries reported.

Total coal output this year reached 883 million tons, 13 million tons more than that of last year.

Some 445.3 billion kilowatt-hours of electricity has been generated this year, 9.4 percent more than in 1985.

And 130.65 million tons of crude oil and 13.1 billion cubic meters of natural gas have been pumped from China's petroleum reserves, 5.76 million tons and 300 million cubic meters more than the figures of last year, respectively.

Daqing, China's largest oil field, has turned out more than 55.5 million tons of crude. This is the 11th year running that the oil field has yielded more than 50 million tons of crude oil.

With a total output of 29.5 million tons this year, China's second largest oil field, Shengli, has contributed more than 40 percent of the total additional output of the country.

Annual output of the Liaohe oil field surpassed 10 million tons for the first time.

As a result of the all-round development in China's energy production, the strain on the coal market has been eased. More coal has been stored and coal prices have fallen, economic analysts said.

For the first time in the past few years, the growth rate of electricity generation surpassed the growth rate of the country's industrial production. "This will help ensure a sustained and coordinated development of industrial production in the whole country," economic experts said.

However, these experts pointed out that the growth of China's energy production still cannot meet the demands of the development of the national economy or the need of the people.

Therefore, they said, energy development remains the key to China's economic construction and must be increased further, officials said.

/9604

CSO: 4010/25

NATIONAL POLICY

ENERGY OUTPUT 'OFF TO FLYING START' IN 1987

OW021148 Beijing XINHUA in English 1143 GMT 2 Feb 87

[Text] Beijing, 2 Feb (XINHUA)--China's energy production has gotten off to a flying start in 1987, according to the State Economic Commission here today.

Mines operating under the Ministry of Coal Industry produced 34.3988 million tons in January, 2.8 million tons more than planned, although 189 of them had stopped producing for equipment overhaul.

The country's January output for electricity was 39 billion kWh, and for crude oil, 79.415 million bbl, up 7.57 and 5.5 percent over January 1986, respectively.

During the Spring Festival holidays between 29 January and 1 February, China produced 3.04 million tons of coal, 4.3 billion kWh of electricity and 10.21 million bbl of crude oil.

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CSO: 4010/29

NATIONAL POLICY

GOVERNMENT MOVES TO EASE CHRONIC POWER SHORTAGE

HK110414 Beijing CHINA DAILY in English 11 Feb 87 p 4

[Summary] Although China's electric power industry has expanded greatly, electricity remains in short supply, according to Qian Zhengying, minister of Water Resources and Electric Power.

During the Sixth Five-Year Plan (1981-85), new generators with a capacity of 22 million kilowatts were put into operation, and electricity production exceeded its targets by 7 percent. In 1986, a record year, more than 430 billion kilowatt-hours of electricity were generated.

But with demand increasing daily, there is still a serious shortage of electricity, says Qian. Apart from Guangxi Zhuang and Ningxia Hui autonomous regions and Yunnan Province, all other provinces and cities have to switch off power now and then to limit power consumption. Many factories and enterprises can only operate 3 or 4 days a week. Although China's total amount of energy generated is one of the highest in the world, its annual per capita consumption is less than half the world average.

The fundamental cause of the power shortage, Qian noted, is the lack of construction funds. With its relatively long construction period, the power industry needs more funds than do other fields. Being public oriented, the benefits the industry reaps belong to the whole society. It cannot be expected to make such profit. The power industry is also a basic one whose development affects other industries.

The nature of the industry has not been fully realized, and the investment in the industry, though increasing, is still smaller than that made in other industries. The development of the national economy has surpassed that of generated energy, which has in turn surpassed the increase of installed capacity.

To ease the shortage, the ministry will work to provide more generators. The Seventh Five-Year Plan calls for new 35-million-kilowatt generator sets, 75 percent of which are thermal and the rest hydroelectric.

Plans call for 550 billion kWh in electricity output by 1990. To carry out this plan, the ministry expects to put 10-million-kilowatts of generating capacity into operation over 1987 and the first half of 1988.

Proper Supply Should Be Guaranteed Despite the Acute Shortage

This task encompasses two parts: Maintenance and repair of equipment to prolong its life, and careful management to ensure the supply of power to major enterprises.

Money is being raised to ease the industry's shortage of funds. Besides state investment and bank loans, the industry has solicited foreign investment, set up joint ventures with local enterprises, and granted 10 percent of the newly generated energy to those that invest in it. In addition, the ministry will start issuing power bonds of 2 billion yuan this year. Enterprises which buy the bonds will be entitled to more power. The bonds will also be issued to individuals, with an interest rate higher than that of bank savings accounts.

Meanwhile, the ministry will speed up management reform. It has also submitted for State Council approval recommendations that prices of generated energy be allowed to float; taxes reduced; and long-term low-interest loans granted.

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CSO: 4010/32

NATIONAL POLICY

LI PENG REVIEWS ACHIEVEMENTS, TASKS OF POWER SECTOR

OW100430 Beijing XINHUA in English 0145 GMT 10 Jan 87

[Text] Beijing, 10 January (XINHUA)--China has decided to build and put into operation power generating units with a combined capacity of 10 million kW in the coming year and a half, according to the Ministry of Water Resources and Electric Power.

Last year, the country built and put into operation generating units with a total capacity of 6 million kW, and its machine-building industry manufactured power generating machinery with a total capacity of 6 million kW.

China still faces an acute shortage of power supply and the country's power industry has a long way to go in meeting the growing demand for power supply of the national economy and the people's life, Chinese Vice-Premier Li Peng said when congratulating the power industry people on what they had achieved last year.

China's machine-building industry should produce generating units with an aggregate capacity of 10 million kW every year during the Seventh 5-Year Plan period (1986-1990), he urged.

Last year, China produced a total of 445.3 billion kWh of electricity, 9.4 percent greater than in 1985.

It was the first time that the growth of the power industry topped that of the nation's industry as a whole, industry officials said.

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CSO: 4010/27

NATIONAL POLICY

MWREP OFFICIAL ON POWER PROJECTS, 1986-1990

OW131320 Beijing XINHUA in English 1312 GMT 13 Jan 87

[Text] Beijing, 13 Jan (XINHUA)--China is raising funds totalling 9 billion yuan to build power projects in 1986-90 period--up 8.16 billion yuan over the previous 5 years--to ease its power shortage.

An official of the Ministry of Water Resources and Electric Power said here today that the country plans to increase its power generating capacity by 35 million to 40 million kilowatts during this period and electricity output by 1990 to somewhere between 550 billion and 600 billion kilowatt-hours.

According to the official, generating units with combined generating capacity of more than 5 million kilowatts are expected to go into operation in the 1986-90 period, up 4.32 million kilowatts over the previous 5 years.

In addition to continuously pursuing the policy of encouraging the state, enterprises, collectives and individuals to build power stations, China will expand the scope of pooling funds from a few provinces and cities in coastal areas to all parts of the country. These funds will be used for the entire construction procedure from building power plants to generating and supplying electricity.

The country will issue bonds totalling 3 billion yuan to ensure generating units with combined generating capacity of 6 million kilowatts go into operation, and at the same time, try to use as much foreign funds as possible to speed up the power industry.

The official said that the contract system will be employed for building power projects and to offer more autonomy to power industry departments.

The amount of electricity in the country went up by an average of 6.4 percent a year between 1981 and 1985 and the generating capacity increased by a total of 20 million kilowatts during this period.

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CSO: 4010/26

NATIONAL POLICY

ENERGY SOCIETY PROPOSES NATION BECOME NET OIL IMPORTER

Shanghai SHIJIE JINGJI DAOBAO [WORLD ECONOMIC HERALD] in Chinese 20 Oct 86 p 3

[Article by Yuan Jiangning [7086 3068 1380], Beijing staff correspondent:
"Experts in the China Energy Society Argue That China Should Gradually Change From an Oil Exporter to a Net Importer--Now That Energy is a Commodity, Prices Ought to Fluctuate Competitively on Domestic and Foreign Markets"]

[Text] Can the thinking of the organizations developing energy in China make another qualitative leap? Do countries maintain that they will always bear the energy burden financially? When won't there be another energy shortage? How does one actually evaluate the import and export policies of crude oil? A group of experts of the chief organization of the China Energy Society are expounding on these questions. Even though opinions vary, a unanimously approved plan has not yet been taken up. However, there are a few experts who believe that it is urgent that energy no longer be resources wedded at a national level but must become as quickly as possible a commodity circulating in the market.

Arguing these points, the experts believe that this is a major transformation of their own energy outlook. At present, products of the energy industries have permeated each sector of the national economy and the quality, costs, and designs of many products and the energy industries are quite inseparable. The adjustment of the energy policies can stimulate the swift development of certain production industries and can cause a rise in quality and a drop in energy consumption for several products. China's energy policies today should strive hard to attain: a reasonable deployment of resources domestically and abroad, an excellence in energy structuring, an excellence in the deployment of energy regions, an increase in the levels of energy consumption per capita and a decrease in the output value of energy, and not in the least consider the question of increasing energy output only.

The experts believe that, to achieve these things, energy must be seen as a commodity and placed on the market. In the past, particular attention was laid on supply and demand and was not well studied, to the point that in some of the foreign literature it was said that, "China doesn't care about energy demand" and "China's energy demand is equal to production output less exports." Actually, the heart of China's energy issue is that the amount of energy consumption per capita is too small (about one-third the world average) and the

energy consumption for the output value is too large (more than four times that of Japan). The former reflects China's low standard of living and the latter shows China's low production levels and serious waste.

Putting energy on the market is not merely a consideration of the energy issue; the profound changes now occurring in China's national economic structure must be considered. Along with the decline of the share in agriculture, where rural villages are looking for the road to modernization and changing their economy from predominantly traditional energy to an economic track where commodity energy is predominant, the main tune in these changes is that it is becoming a process of a change not of the people's will and, in regard to the national decision-makers, it should be foreseen as soon as possible.

The experts pointed out that, due to commodity energy being unable to keep pace with demand, the consumption of firewood in China has still been climbing in recent years and has seriously damaged forests. Already, in Sichuan Province, the area covered by forests in more than 50 counties is less than 3 percent. In Guizhou Province, the area covered by forests was originally 40 percent; now, it has dropped to less than 12 percent. Under these circumstances, the country is not able to guarantee energy. Effective economic measures must be adopted.

In regard to the present energy conservation outlook, the experts expressed doubts. Conservation cannot only be understood as coming from physical volume. From an economic viewpoint, it is a part of a rational resource deployment. Any resource ought to be used more or used less and have complex internal and external interdependent relationships. Its scale, standards, and regulators can only be rational prices. The rationalization of the prices are the basic measures and motive forces for the fine utilization of the resources.

However, energy pricing should not be administratively commanded or fixed and unchangeable. And, it cannot be completed at one time; but, it should be gradually loosened, determined by the market and determined by both the buyers and sellers.

The experts warned that what is foreseen is that, as energy prices are relaxed, corresponding rises in other commodities will necessarily occur. The result will be a reduction in energy demand, a mitigation of the supply-and-demand contradiction, and a rise in the rate of energy utilization. These will also be favorable for energy savings, reduction of energy waste and elimination of backward enterprises.

Looking long-term, energy will be both a domestic and an international commodity, and it ought to be allowed to fluctuate competitively in the domestic and international markets. Not only should it have a spot market price, it should also have a futures market price which can reflect long-term supply contracts. At the same time, enterprises should be permitted, according to price signal feedback, to transfer funds and to extend across industries to invest in order to balance gross supply and gross demand.

At the same time as these things, the reporter also heard several experts make an appeal: the principle of China's oil imports and exports ought to be to have both imports and exports with gradual reduction in exports; after successfully realizing industrial import substitutions and guiding policies for exports, China will become a net oil importer.

The issue which is raised is harsh; one-third of China's crude oil output is exported and two-thirds is used domestically. This does not coincide with China as being both a country lacking in energy and one identified as lacking even more in superior-quality energy resources. This has been especially so since 1981; the price of China's oil exports has been dropping year after year and the export volume of crude oil has been skyrocketing. This violates a basic trade methodology of buying cheaply and selling dearly and cannot but be considered as an unwise situation in foreign trade.

The experts also argued specifically saying that China's crude oil is cheap, and, in regard to exports, it is a superiority; however, it is a false superiority. Because the true price of domestic oil is also the market selling price, it is far higher than the stipulated State price. This explains that the economic benefits to the State in using oil domestically are higher than those for exports generating foreign exchange.

The experts also discussed different countries and regions. Japan is the largest oil importing country. It is also a rich country economically and has the greatest favorable balance of trade. Hong Kong relies completely on imports for its energy sources. However, in 1983, the value of its imported energy sources was only 7 percent of the value of its exports. The experts believe that China's southeastern coastal areas, especially the Shanghai economic zone, has considerable economic benefits for importing oil because: first, the economic benefits to Shanghai's industries would be high and they would be able to use the high-priced, superior-quality energy sources; second, it could improve the structuring of energy sources and raise the utilization rate of the energy sources; third, it would reduce the burning of coal and could alleviate environmental pollution; fourth, processing paraffin-based or asphalt-based oil can enliven product varieties and improve product quality; fifth, local export capabilities are strengthened and foreign exchange for importing oil would be easily balanced; sixth, Shanghai has a surplus of oil processing capabilities. And it goes on like this, the advantages outweighing the disadvantages.

The experts hold, of course, that this is not to say that oil export policies ought to be changed immediately, but that the issue ought to be made clear through study. Afterwards, a transition can be made towards a correct policy. A series of proofs and preparatory work needs to be done for this, including changing the present foreign trade system as quickly as possible.

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NATIONAL POLICY

NEW HIGHWAYS, RAILROADS, POWER LINES SUPPORT ENERGY DEVELOPMENT

Beijing LIAOWANG OVERSEAS EDITION in Chinese No 50, 15 Dec 86, p 14

[Article by Liu Weifu [0491 3262 4395]

[Text] Within the past 5 years, the construction of railroads, highways, and high-tension power lines from China's energy bases to other parts of the country has developed quickly, and the capability for this outbound energy movement has increased by a big margin. The volume of outbound coal has risen from 77 million tons to 170 million tons, an average annual increase of 24 percent.

Railroads

Railroads are the major component of the outbound movement of coal from the bases. Before 1980, the railroad lines for the outbound movement of coal from the bases were the Longhai, Baoji-Chengdu, Jiaozuo-Zhicheng, Handan-Changzhi, Shijiazhuang-Taiyuan, Beijing-Yuanping, Fengtai-Shatucheng-Datong, Beijing-Baotou and other lines. However, these lines were either single-tracked or had obsolete or outmoded equipment and it was difficult to adapt them to the needs of the development and transportation of coal in the overall plan. From 1980 to 1985, the State invested 8.5 billion yuan to be used for the construction of railroads for the bases. These investments comprised 60 percent of the total amount invested in the same period for railroads for the whole country. There were 180 kilometers of newly built railroad, 1170 kilometers of old line redone, 85 kilometers of newly built double-tracked line, and 645 kilometers electrified. Transportation capacity increased 65 percent, and the annual volume of coal transported increased to more than 120 million tons from 72.6 million tons. The key energy base exploited in the previous ten years was Shanxi Province. As a result, railroad construction has made an issue of mainly revolving around "outbound transporting of Shanxi coal." During the 6th FYP, railroad departments stressed the implementing of a technological remake of the existing railroad thoroughfares in Shanxi Province. For the northern route, the electrification of the Feng-Sha-Da line has been achieved. Moreover, adjustments have been made in areas of the line and locomotives and cars have been refurbished. On the Jing-Yuan line, stations were increased and effective lengths of sidings at stations were extended. Preparations were made for further electrification. For the central route, electrification of the Shi-Tai line was completed and automatic blocking and other advanced signaling and dispatching means were adopted. For

the southern route, a remaking of areas of the Han-Chang line was carried out; double-tracking and electrification of the Changzhi-Yueshan section of the Tai-Jiao line was achieved. Aside from this, double-tracking and electrification was carried out to link up the Northern and Southern Tong-Pu lines. After these lines were remade, delivery capacity increased greatly, enabling the outbound volume of coal by railroad in Shanxi Province in 1985 to increase 70 percent over that in 1980. After the Da(tong)-Qin(huangdao) railroad project, the State's largest investment, is finished being built, the annual outbound coal capacity can reach 100 million tons.

In order to enable the coal being shipped out of the bases to move smoothly to all parts of the country, and aside from continuing to build or rebuild partial base railroads with lines linking them to the outside, the State will, within the next 5 years, increase transportation capacity on the (Bei)Jing - Qin(huangdao) line, Shi(jiazhuang)-De(zhou) line, Jiao(dongbandao)-Ji(nan) line, Jin(Tianjin)-Pu(kou) line, the Zhengzhou-Wuhan section of the (Bei)Jing-Guang(zhou) line, and the Zhengzhou-Baoji section of the Longhai line; as for new construction projects, there is the Qin(huangdao)-Shen(yang) line, the completing of the Xin(xiang)-He(ze) line, the Shang(qiu)-Fu(yang) line, and the completion of the Yan-Shi line. At the same time, according to the extended plan of building bases to the west of the Yellow River in the next ten years, the relevant departments will speed up the work on the corresponding railroads ahead of schedule, of which include: the comparison and selection of outbound routes from the Shen-Fu coal field, the preliminary design of the Da(tong)-Junggar line, the preliminary design of the Bao(ji)-Zhong(wei) line, the preliminary design of the Ji(ning)-Tong(liao) line, as well as a plan and a demonstration for a Xi'an to Ankang line, a Xi'an to Baotou line, and other lines.

Highways

Although highways are the minor component in the outbound movement of coal, they play a most important role in short-haul centralized transportation. Shanxi Province can still be taken as an example. Historically, between Shanxi and Henan, Hebei and other provinces and regions, there are many "broken" highways. Existing highways were also mostly developed from what used to be cart roads, and their load-bearing capacity is very poor. In order to change this situation, Shanxi Province has collected monies from many areas, put through the "broken ended" roads, constructed new roads and remade old ones. In 5 years, 1,740 kilometers of highway were newly built and the Datong, Yangquan, and two other arterial highways leading out of the province were constructed. This increased the outbound transportation capacity 25 million tons. Aside from these, there are also seven arterial highways leading out of the province on which construction is now being begun one after another; it is predicted that next year they will all be open for traffic. According to statistics, by the end of 1985, the mileage of highways open to traffic in Shanxi Province had already exceeded 30,000 kilometers. Last year, coal shipped out by highway was almost 18 million tons, an increase of 254.2 percent over 1980.

The relevant departments have announced that, in the 7th FYP, the Ministry of Communications will build four new arterial highways in the energy bases, for

a length of almost 1,300 kilometers. Aside from this, the locales in these base areas will mainly raise their own funds [for construction], but the highways for which the State will assist in construction are: three in Shanxi (more than 1000 kilometers) and one large bridge; five in Inner Mongolia (almost 1200 kilometers) and one large bridge; two in Henan (more than 250 kilometers) and one large bridge; two in Shaanxi (more than 550 kilometers) and two large bridges; and two in Ningxia, (400 kilometers) and one large bridge. Most of the existing highways must be remade to Class 2 and Class 3 highways.

Power Transmission Lines

Concurrent with the great effort to develop railroads and highways and to increase outbound coal volume from the energy bases, another method of sending energy out from the bases is to build pit-mouth power plants utilizing washed coal slurry and some raw coal and to transmit the converted secondary electrical energy out through power lines to the power network nearby. According to the plan, future energy bases will not only ship out large amounts of coal to become China's largest coal bases, they will also transmit out large amounts of power to become China's largest thermal power bases.

For this reason, in recent years, while energy bases at mines and at water [sources] have vigorously raised funds for and have built power plants, two 500,000 Volt, ultrahigh tension power transmission lines, a Datong to Fangshan, Beijing line and a Pingdingshan, Henan to Wuhan, Hubei line, have also been set up as well as a large group of 220,000 Volt and 110,000 Volt power transmission lines. These will allow a powerful current to be sent to the North China, Central China, and Northwest Power Grids continuously. Last year, energy bases transmitted 630 million kWh of power through the Datong-to-Fangshan ultrahigh tension power transmission line. This significantly eased the power supply shortage in the Beijing area.

It is understood that during the 7th FYP, several 500,000 Volt ultrahigh tension power transmission lines--the Shentou-Datong, the Shentou-Tianjin via Xushui, the Pingdingshan-Zhengzhou, and others--will also be set up. These lines and the lines already set up will, with railroad and highway surface transportation, coordinate with one another to send large amounts of energy throughout the country.

13310/12913

CSO: 4013/34

NATIONAL POLICY

ZHAO QINGFU SPEAKS ON ENVIRONMENTAL PROTECTION IN POWER INDUSTRY

Beijing DIANLI JISHU [ELECTRIC POWER] in Chinese No 7, 5 Jul 86 pp 1-3

[Article: "Speech of Vice Minister Zhao Qingfu [6392 1987 1133] of the Ministry of Water Resources and Electric Power at the 1986 National Work Conference on Environmental Protection in the Electric Power Industry"]

[Text] The current national environmental protection work conference on the electric power industry, convened by the Ministry of Water Resources and Electric Power, is primarily studying the summary of environmental protection in the electric power industry in the Sixth 5-Year Plan, the environmental protection program in the electric power industry in the Seventh 5-Year Plan, as well as some specific tasks that must be done this year. The environmental protection office of the ministry drafted a document for general discussion. Reportedly the discussion has been very earnest, views were strongly put, and suggestions were made to supplement and revise the document. These are excellent views. The ministry will immediately hand down the document once it is revised so that everyone will have a common criterion and implement it upon return to their posts.

Today, I will talk about some views on how the work of environmental protection in the electric power industry should be conducted:

1. Environmental protection in the electric power industry is both a very important and difficult task

Everyone has produced results in the Sixth 5-Year Plan. Why then must we talk about this question? Leaders of the Party Central Committee and the State Council take environmental protection very seriously. It is frequently said that although the Ministry of Water Resources and Electric Power has done some work in this area, we still have not sufficiently understood the importance of environmental protection. Environmental protection is a basic state policy and strategic task in China's socialist modernization and construction and is an important component part of the two civilizations; it is neither a trivial issue nor an expedient measure. Moreover, environmental pollution today is becoming increasingly serious and consequently the state demands that in the course of economic and social development we must implement the policy of synchronous planning, synchronous implementation, and synchronous development in economic construction, urban construction and environmental construction in

order to realize the unity of economic, social, and environmental benefits. The electric power industry is an energy industry, and in the short run we will still primarily depend on thermal power. The ratio of coal consumption in the generation of electricity is very high at over 100 million tons per year. The burning of coal brings environmental pollution; the power sector has thus become one of the main sources of pollution. Installed capacity of thermal power has greatly increased in the Seventh 5-Year Plan. By the end of the Seventh 5-Year Plan we will need to annually discharge tens of thousands of tons of ash residue and large quantities of waste water and smoke. The discharge will be high and concentrated, and coal types are multivarious which will bring great difficulties to pollution control.

Particularly when state economic resources are limited, we do not have much money to undertake projects that are technically feasible outside China. Take the case of desulphurization. I think desulphurization facilities take up a very large space in Japanese power plants and large sums of money are spent. China cannot do this because our investment in thermal power construction is 800 yuan per kilowatt. We are required to seek our own path, which therefore makes environmental protection in the electric power industry more difficult. Moreover, environmental protection is a new task, which makes it more necessary for leading departments at all levels to improve their knowledge, and give serious attention and support.

All of us have done a great deal of work during the Sixth 5-Year Plan and the outlook of environmental protection in the electric power industry has undergone great changes. For instance, east China and north China have played a positive role in improving the leadership of the power network bureaus and in advancing pollution control in the various provinces covered by the power networks. The East China Electric Power Administrative Bureau has achieved results in promoting comprehensive utilization of fly ash throughout the power network at a rate of 60 percent, doubling that of 1980: Wangting Power Plant has used up the ash stored in its old ashfield; Shanxi, Hunan, and Heilongjiang have accumulated experience in making the "three simultaneous" checks and environmental monitoring by building a monitoring contingent; Henan Electric Power Bureau has achieved prominent results in ashfield construction, building 17 ashfields in 5 years and providing new pollution control techniques in inclined bar dust removal, filling of pits with fly ash, and using fly ash to extinguish fires in mines; Yunnan Electric Power Bureau has formed an environmental protection leading group, launched environmental protection target assessment within the province, and incorporated environmental protection facilities into the path of production control; because its leaders take it seriously, the Southwest Electric Power Design Institute has established an environmental protection profession office, undertaken the work of environmental impact evaluation, and received the honorable title of "outstanding quality control group" for its comprehensive quality control system; the environmental protection offices of Xi'an Heat Engineering Institute and Nanjing Electric Power Environmental Protection Institute have insisted on the direction of scientific research to serve production, provided a number of new and available techniques for environmental protection in the electric power industry and received 22 achievement awards at various levels; design institutes, electric power

testing and research institutes, and colleges and universities have done a great deal of work in scientific research in environmental protection and environmental protection standards, and have contributed in their own ways to reduce the environmental pollution by thermal power plants.

2. Perfect the environmental protection structure and bodies at all levels

This is an issue of general concern to the comrades, and is critical to doing a good job in environmental protection. An imperfect organization will not suit the task in the future. Based on the views of the comrades after consultation, the Ministry of Water Resources and Electric Power is preparing to establish the "environmental protection leading group of the Ministry of Water Resources and Electric Power" under which will be established an "office of the leading group" responsible for daily routine work. Power network bureaus, provincial bureaus, and planning institutes should also establish environmental protection leading groups with "offices of leading groups" under them. Each power supply bureau, and repair and construction enterprise should have a bureau (plant) director responsible for environmental protection, and an engineer specially responsible for environmental protection should be set up. Each power plant should establish an "environmental protection leading group" with the plant director as the group leader and its members composed of supervisors and persons in charge of scientific offices in concern. In production techniques sections, one to three engineers specially responsible for environmental protection should be set up.

3. Newly expanded power plants must earnestly implement the policy of "prevention first" and control new pollution

To intensify preconstruction work, we should earnestly follow state provisions and do a good job in environmental impact evaluation. Power network bureaus and provincial bureaus must organize this task. Organizing units and units that undertake evaluation should be responsible to the end. In the course of design we should take into account matching environmental protection measures with the various systems of power plants. Comprehensive utilization of the types of dust removers and ash conveyor systems must be centrally considered. The dry ash of electric dust removers is a fairly good cement mixer and concrete mixer, so consideration must be given to the supply of dry ash during design in order to initiate conditions for comprehensive utilization. Design institutes should also be responsible for the design of environmental protection transformation projects of old plants.

Furthermore, construction and production start must be checked strictly, otherwise money will be spent without results. In the future, environmental protection facilities whose construction quality does not meet requirements cannot be put into operation. The ministry's environmental protection office should formulate specific provisions for them. In terms of environmental issues, intensifying the supervision and control of the "three simultaneous" checks in the entire process of power plant construction must succeed in gradual repayment of "old accounts" and must not again owe "new accounts".

4. The control of old plants must be accelerated and environmental control must be intensified

We must first tackle the current problem of discharge of ash into rivers by power plants. This problem must absolutely be solved. All bureaus must implement their plans and this portion of funding for production must be arranged year after year; power plants with extension projects must tackle them altogether during extension. From now on, work should begin early on ashfields which will be filled in the next 5 years. All bureaus must give overall consideration in the program of the Seventh 5-Year Plan and tackle the problem year after year.

The top-priority task concerning smoke and dust is making possible the safe and stable operation of dust removers for large generating units. Current ideological understanding, organizational measures, and level of control all lag behind. Electric dust-removing equipment for a 300,000-kW generating unit costs more than 7 million yuan, and uses 1,500-2,000 tons of steel products, which has become the fourth major piece of power plant equipment (generator, boilers, power, and electric dust remover), but frequently little attention is given to this fourth major piece. The equipment is advanced but control is backward. In the future, production departments must formulate strict rules of operation control.

Consideration must be given to the treatment of waste water in combination with conservation of water resources. Particularly in areas of north and northwest China where there is water shortage, different measures should be adopted to conserve running water and discharge less waste water.

5. Intensify the comprehensive control of environmental targets in the process of electric power production and gradually incorporate assessed targets in environmental protection into the control of power plant production targets by implementing the state's "environmental protection assessment system"

Reference can be made to Yunnan's experience on this point. We must do a good job in environmental quality control, perfect the monitoring system, and unify test methods and test standards. In order to advance environmental protection and do a good job, award regulations have been drawn up that can be tried out. According to the provisions of the environmental protection law, in order to reward units or individuals who have contributed to environmental protection, we can use as cash awards some of the money from the benefits obtained from the comprehensive utilization of fly ash.

6. Suit measures to local conditions, use diverse means, positively develop the utilization of ash residue of thermal power plants, take the path of resource-making and commercialization, and form the tertiary product characterized by coal-burning power plants

This is a task with bright prospects. In the last year of the Seventh 5-Year Plan we will discharge 7 million tons of residue. We must first do this task well. The main residue is a very good building material and in many places

supply cannot meet demand. Its economic results are obvious. At 6 yuan per ton, 7 million tons will be used up. With 42 million yuan we can even save water and electricity. Calculating on the basis of ash-flushing water for 7 million tons of residue, we can annually save over 400 million tons of ash-flushing water. The dry ash of dust removers is also a good material for mixers. The tertiary industry of power plants must undertake this task. I believe that comprehensive utilization of fly ash is better than other sidelines run by power plants. As it has great economic benefits and controls pollution, we should get a handle on it. Moreover, there are various uses such as road construction and agriculture by which large quantities of fly ash can be used up. Yet it will not be used up completely. Large quantities of ash must still be stored in ashfields, and there is a lot more to how they should be built and further utilized. In particular, we should build more ashfields in mountain valleys and we can fill up land for agriculture.

In comprehensive utilization we should, on the one hand popularize large numbers of projects that use ash, and on the other hand we should intensify the task of sorting. We should positively develop projects which use small quantities but yield high economic value and distinct social benefits. Separation of iron and carbon in fly ash not only improves the quality of the ash, but iron powder can also be used for smelting and making cement, and the carbon can be returned to the power plant furnace for burning or it can be put to civilian use. In short, we must gradually enable carbon residue to be used as a resource and be commercialized. In order to mobilize the enthusiasm of all quarters in comprehensive utilization the State Economic Commission has issued documents and formulated the policy concerning comprehensive utilization. The Ministry of Water Resources and Electric Power has also made its supplementary provisions and it is hoped that they will be implemented.

6. Strengthen scientific research capability and continue to do a good job in tackling key scientific research problems in environmental protection in the electric power industry

Scientific research in environmental protection in the electric power industry should be directed at the characteristics of the development of the electric power industry with its large units, high capacity power plants, and high and concentrated discharge of the "three wastes", and research stressed on problems of comprehensive control. Achievements have been made in tackling some synthetic problems which combines research on pollution control, conservation of resources, and development of comprehensive utilization, as well as problems in basic applied research. We should popularize their application as soon as possible.

7. Speed up the training of qualified personnel and improve the quality of the contingent

Building a contingent that is solid in strength with a high technical standard is critical to doing a good job in environmental protection in the electric power industry. Environmental protection is a peripheral science. Currently there is little training of qualified personnel. In the future the Ministry of Water Resources and Electric Power will operate more training classes while

various power network bureaus and provincial bureaus can also independently or jointly operate such classes. Leadership at all levels must take this task seriously. Moreover, attention must be given to the popularization of knowledge on environmental protection. In the future, various types of training classes for bureau (plant) directors and supervisors must teach professional knowledge on environmental protection.

Through this conference, the task of environmental protection during the Seventh 5-Year Plan already has a clear guiding ideology and environmental goal. Moreover, specific control and technical measures have been put forward. The several specific tasks that must be done in 1986 have been planned and we are required to implement them. I believe that after 5 years of hard work, environmental pollution by the electric power industry will be further improved, comprehensive utilization will have even greater development, and the electric power industry will make even greater contribution to the state and society.

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NATIONAL POLICY

ENVIRONMENTAL PROTECTION IN POWER SECTOR'S 6TH-7TH FYP

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[Article: "Environmental Protection in the Electric Power Industry: Summary of the Sixth 5-Year Plan, Main Points of the Program in the Seventh 5-Year Plan, and Work Arrangement for 1986"]

[Text] Since the Third Plenary Session of the Party Central Committee, environmental protection has further demonstrated its significance along with the shift in emphasis of the whole party's work to modernization. The promulgation of the "environmental protection law" signifies that environmental protection has entered the stage of legal institutionalization. In 1984 the state determined that it is a basic state policy in China's socialist modernization to protect and improve the environment, thus further promoting progress in environmental protection.

Considerable progress has been made in environmental protection in the electric power industry during the Sixth 5-Year Plan. The characteristics of electric power development in the Seventh 5-Year Plan are "large generating units, large power plants, and power station clusters", whose pollution is high and concentrated, and there is already a tendency for its environmental impact to develop from individual to some general sources. As a result, environmental protection in the electric power industry is faced with a grim situation. It is urgent that we do a good job in environmental protection in the electric power industry.

I. Summary of Environmental Protection in the Electric Power Industry During the Sixth 5-Year Plan

The environmental outlook in the electric power industry during the Sixth 5-Year Plan underwent great changes due to the attention given to it by leaders at all levels and the common effort of comrades from various quarters of environmental protection. Discharge from thermal power plants above the norm drastically decreased. Compared to the end of 1980, ash residue discharged into rivers in 1985 fell by about 2,220,000 tons, smoke and dust released into the air decreased by 640,000 tons, exhaust noise has basically reached the norm, and comprehensive utilization of ash residue has increased by about 4,140,000 tons. Specifically the following aspects of work have been done:

1. We have earnestly implemented the policy of "prevention first" and have gradually incorporated the "three simultaneous" checks of new and extended power plants into the various stages of power plant construction. Environmental impact evaluation has basically been performed on new and extension projects. Once the design of power plants includes environment protection, construction of environmental protection projects and principal parts of the project may begin simultaneously.

2. We have closely combined production with environmental control. Environmental protection control projects of old plants have gradually been incorporated into the channel of production improvement measures. During the Sixth 5-Year Plan, the total amount for the 322 environmental protection control projects arranged by the Ministry of Water Resources and Electric Power was 345,150,000 yuan which was 35.82 percent of the fund for key measures of power plants, and 13.3 percent of the fund for key measures in the entire electric power system.

3. We have insisted on technological advance and scientific research taking the lead. In the past 5 years the ministry has arranged a total of 57 scientific research projects, of which 12 received scientific and technological achievement awards at and above the ministry level, 2 received research report awards, and 3 projects in cooperation with other ministries received the state technical improvement awards. These scientific research achievements have provided new techniques for pollution control of thermal power plants and the comprehensive utilization of ash residue.

4. We have strengthened environmental control. In order to implement the environmental protection law and the environmental quality standards specified by the state, in accordance with the specific conditions of the electric power industry, we have organized the study and formulation of norms for atmospheric discharge by thermal power plants, norms for the discharge of waste water by thermal power plants, and norms for the discharge of thermal water. We have also organized and formulated the "rules for environmental monitoring of thermal power plants", "method for monitoring water quality", and other rules, five of which have been promulgated.

5. We have initially built a contingent in environmental protection control in the electric power industry that has certain professional skills in scientific research, monitoring, and teaching. According to incomplete figures, there are about 1,450 persons of whom 43 percent have attained higher education.

6. With the approval of the China Society of Electrical Engineering we have established the "power industry's environmental protection professional committee" with 8 professional subcommittees. The periodical DIANLI HUANJING BAOHU [ENVIRONMENTAL PROTECTION IN THE POWER INDUSTRY] has already been published by the power industry's environmental protection professional committee and the Power Industry Environmental Protection Institute, thereby developing academic interchange in environmental protection.

However, some problems still existed in the work during the Sixth 5-Year Plan. Essentially, implementation of the spirit of the 1984 Second National Congress of Environmental Protection was poor, management did not have a good grip, organizing agencies were still imperfect, and individual power network bureaus did not have a professional staff in environmental protection. The task we faced in electric power construction expanded while organizing agencies were incompatible with the tasks of planning institutes; some power plants were still discharging ash into rivers, seriously polluting water resources; the achievements of some scientific research was not promptly organized for popularization, with the result that some scientific research projects were placed under low standards and duplicated; and the efficiency of some control facilities was relatively poor.

II. Key Points of the Environmental Protection Program in the Power Sector of the Seventh 5-Year Plan

According to the state's program for the electric power industry in the Seventh 5-Year Plan, increased capacity of thermal power to be put into production in the Seventh 5-Year Plan is between 22,000-27,000 MW, on which basis it is predicted that by 1990 the discharge of ash will reach 70 million tons. If the efficiency of dust removers is taken at an average of 93 percent, there will still be a discharge of about 4.5 million tons of smoke and dust into the air, the quantity of recycled water will reach 38 billion tons, and ash-water discharge will be 1.02 billion tons. Since the capacity of power plants is increasing, pollutants become highly concentrated and it is already difficult for unitary control to work, consequently environmental protection of thermal power plants are faced with the situation of highly demanding and highly difficult prevention and control techniques.

1. The guiding technology for the environmental protection program in the power sector in the Seventh 5-Year Plan should be: implement the principle of "prevention first, combining prevention and control, and comprehensive control", closely combine it with electric power production, continue to use scientific research to open the way, insist on being practical and realistic, suit measures to local conditions, use diverse means, and find a new course for environmental protection that suits China's actual conditions and unifies economic, environmental, and social benefits.

2. Specific targets in the Seventh 5-Year Plan require that:

- (1) Basically succeed in not discharging ash into rivers. All ash fields that are already filled should be utilized. Strive to succeed in utilizing 10 million tons of ash residue per year.

- (2) For the quantity of smoke and dust discharged, all new power plants and generating units put into production should meet the discharge norm. Old plants should reach 90 percent of norm, the efficiency of dust removers should reach an average of 93 percent, and the efficiency of wet dust removers must be 92 percent or higher.

(3) Acidic and alkaline waste, oily waste water, and other industrial waste water should be discharged according to the norms, and waste water in everyday life must undergo treatment.

(4) Exhaust noise of furnaces should meet the norm.

(5) Afforested area should make up 60 percent of the area that can be afforested.

In order to realize these goals, "first we rely on policy, second we rely on control, and third we rely on technology." Major measures include:

1. To meet the program requirements of the state's Seventh 5-Year Plan, "intensify environmental control", "build and substantiate effective environmental control bodies that are compatible with the tasks," and strengthen leadership in environmental protection in the nationwide electric power industry.

(1) The Ministry of Water Resources and Electric Power establishes the "environmental protection leading group of the Ministry of Water Resources and Electric Power". Its group leader and assistant group leader are undertaken by the two vice ministers with the "office of the leading group" as its standing organ.

(2) All electric power administrative bureaus, electric power bureaus, and planning institutes establish "environmental protection leading groups" with the "office of the environmental protection leading group" as the administrative body. Power supply bureaus and repair and building enterprises should set up responsible personnel in environmental protection, various power plants should establish leading groups in environmental protection with the plant director as the group leader, and its membership composed of chief engineers and persons in charge of scientific offices in concern.

Personnel quotas should be readjusted and resolved by each unit. Each unit must resolve this during the first half of the year and report on its body and submit a name list to the ministry's environment protection leading group.

2. Strictly carry out the 1986 Guo-003 document of the State Council's Environmental Protection Commission, State Planning Commission, and State Economic Commission concerning the issuing of the circular "Method of Environmental Protection Control in Construction Projects," make the "three simultaneous" checks properly, earnestly do a good job in each phase of power plant construction, and gradually perfect environmental monitoring and environmental control in each phase. Do a good job in preconstruction work, improve the quality of environmental impact evaluation, and strictly implement the spirit of the circular mentioned above. During design we should implement state environmental norms of concern, and properly handle the relationship between enforcing environmental norms, satisfying the requirements of production, and economizing investment. We must continuously improve the design standards of projects in the environmental protection system of thermal power plants so that environmental installations may match each other and

operate stably. We must make inspection concerning the "three simultaneous" checks on projects that go into operation in the current year. The environmental protection office of the Ministry of Water Resources and Electric Power will also organize mutual inspection among key projects. The status of the "three simultaneous" checks should be made public each year.

3. Intensify control, gradually realize a comprehensive evaluation system for environmental norms, try out the "environmental protection evaluation system for industry enterprises" and the "award regulations for environmental protection in the electric power system", intensify control of environmental norms, and praise the advanced to promote control of old plants. On the basis of doing a better job in investigating the sources of industrial pollution, earnestly understand their types and quantities and the actual results of various environmental protection installations. Projects which cannot meet the norms should be improved in combination with production, and a program of control for the Seventh 5-Year Plan should be formulated and implemented year after year.

Successively try out the "environmental protection evaluation system for industrial enterprises" and incorporate it into the channel of production target control in power plants.

According to the provisions of the environmental protection law, we should practice the system of appraisal, comparison, and awards, in order to reward and commend units and individuals highly effective in environmental protection and pollution control. The method of appraisal and comparison is based on the "award regulations for environmental protection in the electric power system", and is held within the nationwide electric power system once every three years.

4. Gradually establish various control and technical standards and regulations in environmental protection in the electric power industry, including standards, regulations, guidance and rules, provisions, manuals and measures for environmental control, techniques, and monitoring. This is a long-term task. During the Seventh 5-Year Plan we should gradually formulate them in order of their importance and urgency according to needs.

5. Perfect the environmental monitoring system for thermal power plants. In accordance with the program of the "regulations on environmental monitoring of thermal power plants" (trial), there is a plan to build the "national environmental monitoring center for thermal power plants" (that is, general monitoring station) at the Nanjing Environmental Protection Institute which will form a three-step station network with "provincial monitoring stations" and the "power plant monitoring stations (group)". Besides undertaking the task of monitoring on a schedule prescribed by regulations, it should also stress developing continuous monitoring of pollution sources in thermal power plants. In order to search for experience in setting up a pollution source model and developing a forecast of pollution sources, select one or two power plants (pit entrance, coastal) which are nationally representative and develop on-line atmospheric monitoring to facilitate checking of preliminary evaluation of the atmospheric environment and accumulate data for building the

model. In order to do this task properly, the Environmental Protection Research Institute of the Ministry of Water Resources and Electric Power must combine it with the institute's construction and at the same time take the establishment of the monitoring center into account. All power network bureaus and provincial bureaus should deploy their resources as soon as possible, and substantiate and perfect the monitoring stations in order to shoulder the various tasks specified in the "regulations".

6. Boost our scientific research capability, continue to tackle key scientific research problems, and further produce new achievements in the reduction of pollution by power plants, conservation of water, conservation of energy, and turning fly ash into a resource. Since the overall arrangement of thermal power construction is primarily based on extension, along rivers and the coast, and on using high-capacity generating units, we must tackle the research, application, and popularization of the following key problems, besides completing the projects carried over from the Sixth to the Seventh 5-Year Plan:

- (1) Law of atmospheric diffusion in coastal areas and complex mountainous terrain;
- (2) Thermal pollution of waters by recycled water discharged from power plants near the coast and tide-sensitive river sections;
- (3) Developing project application of fly ash to fill mines in order to open up underground ash fields for power plants;
- (4) The design, manufacturing, installation, operation, and other questions relating to dust removers for large generating units;
- (5) Pollution of bodies of water by ash flushing and its control (pH value, heavy metals, and other toxic elements);
- (6) Physical and chemical properties of fly ash and their method of testing, test standards, and the development of test instruments;
- (7) Sorting of fly ash and study of ash transportation system;
- (8) Tackling the problem of desulphurization of high-sulphur coal burned in power plants;
- (9) Application of computer techniques in the realm of environmental protection; and
- (10) Monitoring techniques and standards.

7. Undertake control of ash residue and comprehensive utilization by suiting measures to local conditions and using diverse means. Popularize various separation techniques, speed up the progress of turning fly ash into a resource and its commercialization by strengthening lateral relationships and develop tertiary industries characterized by coal-burning power plants.

Since the quantity of ash discharged by large thermal power plants is very high and currently we are still unable to utilize it completely, we still need to combine the storage and use of ash. Construction of ash fields must suit measures to local conditions. Regardless of their construction in mountainous areas, plains, and pit entrances, there should be comprehensive prevention and control carried out in combination with land reclamation, the filling of furrows, filling of coal mines in collapsed areas, agricultural use of ash, the filling of pits, pit fire extinction by grouting, and building underground ash fields.

Comprehensive utilization of ash residue in 1985 was about 7,815,000 tons, approximately 20.74 percent of the total amount of ash discharged. In the future, comprehensive utilization should first stress projects that use large quantities of ash and that are technically mature. For instance, the use of ash residue separation and removal can save large quantities of ash flushing water and power consumption by the plants. Moreover, 10 percent of the main residue can be utilized and can yield considerable economic benefits. Besides, ways to use large quantities of ash is in road construction, architectural construction, building materials, hydraulic construction, and agriculture. If we essentially do well in handling the work described above, comprehensive utilization of ash by the end of the Seventh 5-Year Plan will definitely reach 10 million tons per year. At the same time we must popularize coal selection, iron selection, and other separation techniques. We should develop their use according to the characteristic of their multiple functions, enable fly ash products to gradually become a resource and become commercialized, forming a material of a developing realm.

8. Train qualified personnel in multiple ways and at multiple levels, accelerate building an environmental protection contingent. Environmental science is a new discipline and is a multi-disciplinary peripheral science. As a discipline, environmental engineering in the electric power industry is still in the development stage and is still very incomplete. Therefore, we must first do a good job in operating the regular course of "environmental" engineering in the electric power industry", offering specialized courses and disciplines at the four academic institutions in the electric power system. At the same time, in order to meet the urgent needs of developing environmental protection in the electric power industry, we also plan to set up the specialized field of environmental engineering at universities and train staff members at their posts, and to set up specialized on-the-job training at institutes of higher education (one and a half to two years).

III. Some Specific Tasks That Must be Done in Environmental Protection in the Electric Power Industry in 1986

Based on the "Main Points of the 1986 Plan for Specific Tasks in Environmental Protection Work" discussed and approved by the Sixth Conference of the State Council's Environmental Protection Commission and the environmental protection program in the electric power industry in the Seventh 5-Year Plan, we must do a good job in the following:

1. Tackle and implement the setting up of environmental protection bodies at all levels. It is hoped that this can be completed in the first half of the year.
2. Draw up the environmental protection program in the electric power industry in the Seventh 5-Year Plan. The program for each unit should be submitted to the Ministry of Water Resources and Electric Power by mid-May, which will in turn be submitted to the State Council's Environmental Protection Commission in June.
3. Continue to do a good job in handling the formulation of standards, submission of reports, and publishing work. We should strive to publish "method for analyzing the quality of water discharged from thermal power plants" in the first half of the year; submit the "norms for atmospheric discharge of agricultural pollutants by thermal power plants" this year after it is supplemented and revised; complete the "limit values for thermal water discharge by thermal power plants in east China and northeast China", and the appraisal of static intensity and bulk density measuring meter and method in the "method of determining the specific physical property of fly ash"; put forward the "detailed rules and regulations for the environmental protection assessment system in the electric power system" (trial draft), "award regulations for environmental protection in the electric power industry" (trial draft), and "temporary provisions for the depth of contents in environmental impact reports for the feasibility study phase of thermal power plants".
4. Earnestly do a good job in investigating pollution sources in the electric power industry. Necessary actual tests must be conducted on projects whose pollutant monitoring formerly did not yield accurate figures, strive to obtain accurate figures in investigating sources of pollution, and all bureaus should make year-end summary reports to the ministry.
5. Enlarge the scope of trial on the basis of summarizing the 1985 experience from experiments of the "assessment system of environmental norms." All provinces should strive to make at least one power plant a clean plant.
6. By the end of the year we must examine the status of implementation of the "three simultaneous" checks on projects which go into production this year.
7. Complete the various scientific research tasks for this year according to plans and contracts. Appraisal must be organized for completed research projects such as the electrostatic dust remover's new-type power supply installation, sorting of fly ash, dry spray, and smoke desulphurization test. Appraisal must also be promptly organized for scientific research projects arranged by the provinces, and projects whose conditions are ripe should be popularized and used.

Table. Summary of Arrangements of Environmental Projects of Technical Measures in the Sixth 5-Year Plan (in millions of yuan)

Project and Name		1981	1982	1983	1984	1985	1981-85
Ash Discharge	Number of Projects	52	53	46	37	40	228
	Fund Arranged (yuan)	66.42	69.62	45.72	48.56	48.235	278.605
Comprehensive Utilization	Number of Projects	8	2	4	4	3	21
	Fund Arranged (yuan)	4.38	1.60	4.37	4.00	2.00	16.350
Smoke and Dust Removal	Number of Projects	8	7	13	11	12	59
	Fund Arranged (yuan)	7.00	6.50	12.10	10.36	3.27	39.230
Waste Water Treatment	Number of Projects	1	3	5	2	1	12
	Fund Arranged (yuan)	1.50	3.00	4.60	1.28	0.59	10.970
Total Fund Arranged (yuan) for Power Plant Environmental Protection Projects		79.30	80.72	66.79	64.20	54.145	345.155
Total Fund Arranged (yuan) for Power Plant Projects		180.60	213.86	186.89	201.32	180.835	963.505
Ratio of Environmental Protection (in percent)		43.91	37.74	35.74	31.89	29.94	35.82
Total Fund Arranged (yuan)		489.28	528.04	605.76	613.53	358.92	2,595.530
Ratio of Environmental Protection (in percent)		16.21	15.29	11.03	10.46	15.06	13.30
Total Number of Projects for Each Year		69	65	68	54	56	322

Table. Control and Technical Standards in Environmental Protection in the Electric Power Industry

Standards Already Issued

- (1) Method for analyzing quality of water discharged from thermal power plants (SD 164-85)
- (2) Fly ash used in cement and concrete (GB 1596)
- (3) Specifications for drawing up environmental impact reports in site selection phase of nuclear power plants (SD 166-85)
- (4) Method for testing flue dust
- (5) Regulations for environmental monitoring of thermal power plants (trial)

Standards Being Formulated

- (1) Standards for atmospheric discharge of pollutants by thermal power plants (GB)
- (2) Standard reference substance of fly ash (GB)
- (3) Detailed rules and regulations for implementing the evaluation system of environmental protection in the electric power system (trial)
- (4) Award regulations for environmental protection in the electric power industry
- (5) Temporary provisions for depth of content of environmental impact reports in feasibility study phase of thermal power plants
- (6) Method for determining the specific physical property of fly ash
- (7) Standards for thermal water discharge from thermal power plants (inland waters): limit value for east China; limit value for northeast China
- (8) Standards for discharge of ash-water from thermal power plants
- (9) Technical rules for applying fly ash in mortar and concrete (GB)
- (10) Standards for controlling harmful substances in flyash used in agriculture (GB)

[Table continued next page]

Standards Planned for Formulation

- (1) Regulations on environmental protection control in electric power industry
- (2) Regulations for environmental monitoring of thermal power plants (SD)
- (3) Technical guidance and rules for environmental impact assessment of thermal power plants
- (4) Principles and procedures of scientific research problems in environmental protection in electric power industry
- (5) Method for testing air current distribution of dust removers
- (6) Method for soaking and removing toxic elements in fly ash of thermal power plants
- (7) Method for determining toxic elements in flyash of thermal power plants
- (8) Standards for discharge of waste water from thermal power plants
- (9) Standards for thermal water discharge from thermal power plants (inland waters): limit value for central-south China; limit value for southeast China
- (10) Standards for thermal water discharge from thermal power plants (coastal waters): limit values for Bohai, South China Sea, and East China Sea areas

Note: SD indicates standards issued by the Ministry of Water Resources and Electric power; GB indicates state standards.

9586/9871

CSO: 4013/149

NATIONAL POLICY

BRIEFS

NATIONAL ENERGY DATA POOL--Beijing, 8 January (XINHUA)--China now plans to create a national energy data pool during the current Seventh 5-Year Plan period. A committee of 40 scientists today approved feasibility studies on the pool, 1 of the 20 computerized data pools planned by the Chinese Academy of Sciences for various fields of work during the 1981-1988 period. "The pool will help in decisionmaking and research by storing and providing information about China's energy production, transportation and conservation as well as environmental protection required in the process," a committee official told XINHUA. Responsible for the feasibility studies for the energy pool were experts from the Academy and the State Economic Commission. [Text] [Beijing XINHUA in English 1432 GMT 8 Jan 87 OW] /12232

CSO: 4010/27

POWER NETWORK

MWREP MINISTER COMMENTS ON POWER SHORTAGE

HK081412 Hong Kong LIAOWANG OVERSEAS EDITION in Chinese No 1, 5 Jan 87 pp 11-12

[Article by Du Yuejin [2629 6460 6651]: "Qian Zhengying, minister of Water Resources and Electric Power, Talks About Policy for Solving Electric Power Shortage"]

[Excerpts] The tense situation of insufficient electric power in China has existed for many years, yet the entire society's demand for electricity is growing. Under these circumstances, how can China's electric power industry take on the challenge? In order to understand the situation, this reporter had an exclusive interview with Qian Zhengying, minister of water conservancy and electric power who answered questions on the issue.

Question: Could you please discuss the development of China's electric power industry in recent years and the basic situation regarding the present demand and supply of electric power around the country?

Answer: The present state of China's electric power industry can be summarized in one sentence: "The progress is significant, but the power shortage is tremendous."

In recent years, the state has put the acceleration of electric power building on the main agenda, and after determining the strategic emphasis of energy construction, it also formulated a guideline on energy construction with the focus on electric power building. With the active efforts of all workers and staff members in the power network, along with the close coordination with other sectors, our country's electric power industry has developed rapidly. During the Sixth 5-Year Plan, from 1981 to 1985, new power generators put into production throughout the country reached 22 million kilowatts, exceeding the plan quota by 7 percent. In 1985, generated electricity in the country totaled 410 billion kilowatt-hours, surpassing the planned target by 13.4 percent. Entering into the new 5-year plan, electric power building has made great strides. After power generators with a capacity of 5 million kilowatts were put into production in 1985, new, additional ones with a capacity of more than 5 million kilowatts were installed last year, making 1986 the year with the greatest amount of newly-installed capacity in Chinese history. Electricity generated exceeded the plan's 430 billion kilowatt-hours and neared 450 billion kilowatt-hours, an increase of 8.3 percent over 1985's.

However, compared with the needs of the national economic development, the conflicts between our country's power supply and demand remain to be eased. They continue to deepen. According to 1978 statistics, power shortages throughout the country reached 40 billion kilowatt-hours, while installed capacity was 10 million kilowatts short. Based on estimates from early last year, the above "gaps" have widened. At present, aside from Guangxi, Yunnan, Ningxia, and other minority nationalities-populated provinces and regions, all areas are forced to restrict electricity consumption. Many enterprises can only operate 3 or 4 days a week. Hence, some 20 to 30 percent of the country's production capacity cannot be effectively utilized. As far as total values are concerned, our country's installed capacity generated electricity is already in the forefront of the world. However, our per capita consumption is not even half of the world's average. Therefore, the task confronting the electric power industry is quite enormous.

Question: What do you think are the basic reasons behind our country's power shortage?

Answer: There are many reasons for the country's insufficient electric power. However, basically speaking, it is still the insufficiency of construction capital. The electric power industry is a capital-intensive industry. Generally speaking, the required investment is larger than that for other industries. The electric power industry is also a public service industry. The benefits go to society. It should not ask for excessive profits, nor should it become a liability and thus be unable to develop.

Question: Confronted with such a serious situation, what policies will you adopt?

Answer: First, while we strive to maximize internal potentials, we will also mobilize all forces to install more generators, and do so rapidly in order to ensure completion, as well as seek to surpass the quota of the basic plan on electric power determined by the state. According to the "Seventh 5-Year Plan," new and additional generators with a capacity of 30 to 35 million kilowatts will be installed from 1986 to 1990, with 75 percent made up of gas-powered generators and the rest of water powered ones. By 1990, generated electricity in the country should reach 550 billion kilowatt-hours, and thus prepare a construction scope of 30 million kilowatts for the "Eighth 5-Year Plan." Nevertheless, this is still not enough to meet the needs of national economic development. In order to ease the country's power shortage situation as soon as possible, we will strive to put into production a generator system with a capacity of 3 to 5 million kilowatts and to make generated energy reach 600 billion kilowatt-hours. At the same time, we will strive to prepare a construction scope of some 50 million kilowatts for the "Eighth 5-Year Plan." As a first step towards realization of these schemes, we drew up plans late last year for the installation of generators with a capacity of 10 million kilowatts this year and the first half of next year. We will also make concrete arrangements with the State Planning Commission and other concerned departments on the issues of materials, equipment, and transportation, all

of which are necessary for the completion of this task. Such an extensive, year-long arrangement of the electric power production plans is unprecedented. This is suitable to fundamental electric power construction which is characterized by a vast scale and lengthy production cycle, and thus is beneficial to balanced operations and raising project quality.

Question: Finally, could you please speak on the prospects of attracting foreign investments and introducing technology and equipment in the country's electric power construction?

Answer: We wish very much to cooperate with foreign countries, be it sole or joint investment, credit or barter trade, and Eastern European state or Western country. We welcome them all.

Actually, we have made a good start in cooperation with foreign countries in recent years. In 1985 alone, we signed contracts to purchase generator systems with capacity of 8 million kilowatts, as well as some credit agreements with factories from Italy, the FRG, Norway, Czechoslovakia, France, the USSR, Japan, the United States, and Canada. We are a developing country. On one hand, the "gap" in power supply and demand is enormous and there is an urgent need to accelerate the pace of construction. On the other hand, there is insufficient capital, technology, and equipment. Hence, expanding cooperation with foreign businessmen is necessary and natural. It can be said that China today is the world's largest market for power equipment.

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CSO: 4013/42

POWER NETWORK

EAST ADDS 1,325 MEGAWATTS IN NEW CAPACITY IN 1986

OW241944 Beijing XINHUA in English 1443 GMT 24 Feb 87

[Excerpts] Shanghai, 24 February (XINHUA)--Energy-short Eastern China has taken a step further toward easing its severe power shortage as 1,325,000 kW new generating units were put into production last year.

The completion of three high-tension power transmission lines and a 600,000 kW generating unit by 1988 will mark a significant step toward modernization of its power supply system.

The area, covering Jiangsu, Zhejiang, and Anhui provinces and Shanghai municipality, is the most developed region in the country but energy shortage restricts its production, which accounts for 30 percent of the country's total in terms of output value. Power development has thus become a top priority in state planning.

Zhou Xianggen, director of the East China Power Administration, told XINHUA that the area will invest 2.5 billion yuan this year in building power projects totalling 275,000 kW in generating capacity and in the last 3 years of the 5-year plan period ending 1990, new generating capacity is expected to increase at an annual rate of 2 million kW.

Zhou said that the total investment during the 5 years from 1986 to 1990 will come to 15.8 billion yuan, most of which will be raised by issuing bonds, using foreign investment, and by local government, enterprises, and individual persons.

He said that a loan provided by the world bank is being used to build the Beilun power plant and a 500,000-volt power transmission line from Xuzhou in northern Jiangsu to Shanghai, adding that negotiations are going on with the China International Trust and Investment Corporation and a Hong Kong power company to build a power plant in Wuxi City.

Towers for two other power transmission lines are being put up. One is a 1,080 km direct current power transmission system which will carry electricity from Gezhouba

Province to feed the east China power grid and the other will transmit power from the coal production center of Huainan in Anhui to Shanghai.

Zhou said that the power grid serving the area will have four 600,000 kW generating units and thirteen kW generating units and five big coal-fired power plants each with a generating capacity of at least one million kW by the year 1990. In addition, the first 300,000 kW nuclear power plant in Zhejiang is expected to be completed around 1990 to feed the power grid of the area.

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CSO: 4010/34

POWER NETWORK

SCIENTISTS PROPOSE PLAN TO LINK COUNTRY'S POWER GRIDS

OW211102 Beijing XINHUA in English 1049 GMT 21 Feb 87

[Excerpt] Beijing, 21 Feb (XINHUA)--After proposing construction of 15 power stations on a section of the [Huang He] expected to save 1 billion yuan in state investment, scientists have now recommended linking northwest China's power grid with those of other areas.

"The linking of the grids in northwest, north, and southwest China will help the country save 1.3 billion yuan in extra investment in the electricity industry." An official of the Northwest China Survey and Design Institute, under the Ministry of Water Resources and Electric Power, was quoted by WORKERS DAILY today as saying.

After a 30-year-long survey of the Huang He, China's second-longest, the scientists proposed the construction of the 15 hydroelectric power stations on the section of the river from [Longyangxia] in Qinghai Province to [Qingtongxia] in the Ningxia Hui Autonomous Region.

According to the scientists, when the construction of the Longyangxia hydroelectric power station is completed, it will enable other power stations on the river to generate an additional 1 billion kilowatt-hours each year, saving 1 billion yuan in investment for the state.

According to the scientists' suggestion, northwest China's grid could supplement the north China grid at its peak period of use. The north China grid could transmit electricity generated by thermal power plants to northwest China when less power is used.

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CSO: 4010/33

POWER NETWORK

SHANXI SUPPLYING MORE POWER TO BEIJING, TIANJIN, HEBEI

OW141029 Beijing XINHUA in English 0647 GMT 14 Feb 87

[Summary] Taiyuan, 14 February (XINHUA)--Shanxi Province, has become the largest supplier of electricity in the region by transmitting more than 3.45 billion kWh last year to Beijing, Tianjin, and Hebei Province--66 percent more than in 1985.

Meanwhile, the province has jumped to eighth position in the country in terms generating capacity.

In 1986, the output value of its power industry was 21.6 percent more than in 1985 and its annual output increased by 19.1 percent, as against the country's average increase of 9 percent, according to a local report.

Shanxi produced 218 million tons of coal last year. Being richly endowed with this natural resource, the provincial government accelerated the construction of new power plants and stations and renovation of old ones.

The Shentou power plant in northern Shanxi is the province's largest thermal power plant with a design installed generating capacity of 2.35 million kW. The first generating set of 1.2 million kW has started operation.

A local official predicted a leap forward for the province's power industry in the near future. "It will supply more electric power to other regions," he said.

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CSO: 4010/34

POWER NETWORK

BRIEFS

INCREASED INVESTMENTS--Beijing, 3 Feb (XINHUA)--China will produce power generating units with a combined capacity of 10 million kilowatts to meet increasing demands, according to CHINA'S MACHINERY NEWS. Units with a generating capacity of 30 million kilowatts will be added to China's energy network during the next 3 years. Energy, transportation, telecommunications and the raw materials industries remain a weak link in the country's national economic development, the report said, adding the state will continue to increase investment in these infrastructure and basic industries. While striving to meet an annual production capacity of 10 million-kilowatt generating units a year by 1989, the paper called on enterprises to focus on improving product quality. [Text] [Beijing XINHUA in English 0123 GMT 3 Feb 87] /8309

LIAONING 500KV LINE--A 500,000-volt ultrahigh tension power transmission line of the northeast power grid was recently constructed and commissioned. Extending from Dongfeng County in Jilin Province to Liaoyang County in Liaoning Province, this 305-km-long power transmission line is one of the key state projects during the Seventh Five-Year Plan period. Through this power transmission line, the power generated by the Baishan, Hongshi, and Fengman hydroelectric power stations will be directly transmitted to the power grid. [Excerpt] [Shenyang Liaoning Provincial Service in Mandarin 2200 GMT 21 Dec 86 SK] /12858

JILIN SUBSTATION COMPLETED--Changchun, 21 Dec (XINHUA)--A 500,000-Volt transformer substation in Jilin Province has gone into operation. A major state project, the substation will help regulate electricity supply in northeast China, one of the country's heavy industrial bases that suffers from severe power shortage. With the substation, electricity generated by hydroelectric power stations in Jilin Province will be transmitted to southern Liaoning Province in the wet summer season and, in the dry winter season electric power from thermal power plants in southern Liaoning Province will be transmitted to Jilin Province. [Text] [Beijing XINHUA in English 1113 GMT 21 Dec 86] /9604

CSO: 4010/32

HYDROPOWER

SMALL STATIONS PLAY VITAL ROLE IN EASING POWER SHORTAGE

OW131220 Beijing XINHUA in English 1037 GMT 13 Jan 87

[Text] Beijing, 13 Jan (XINHUA)--Nearly 300 million Chinese, or one-third of China's population, now depend on small rural hydroelectric stations for their supply of electric power, according to today's PEOPLE'S DAILY.

A small hydroelectric station usually has a generating capacity of up to 15,000 kilowatts. The Chinese government is encouraging farmers to raise money for construction of small stations in a campaign to ease power shortages.

Chinese farmers built small stations with a combined capacity of 540,000 kilowatts last year, bringing the total capacity of such stations to 10 million kW--one-eighth of China's total power generating capacity.

Farmers in areas depending heavily on small stations have erected 1.94 million kilometers of power transmission lines, the paper said.

"The development of small hydroelectric power stations helps rural areas achieve prosperity promptly," it said. For example, with the help of 30,000-kW stations Xinchang County in coastal Zhejiang Province has doubled its combined industrial and agricultural output value over the past 3 years.

Moreover, 100 counties all over the country now serve as pilot projects in achieving rural electrification through construction of small power stations.

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CSO: 4010/26

HYDROPOWER

SMALL STATIONS BRING POWER TO GUIZHOU'S COUNTRYSIDE

OW182027 Beijing XINHUA in English 1557 GMT 18 Jan 87

[Text] Guiyang, 18 Jan (XINHUA)--Thanks to the construction of small hydroelectric power stations, electricity now reaches more than 43 percent of peasant households in southwest China's Guizhou Province.

Supplying 53 percent of the province's villages, there are more than 3,000 such stations with a total installed capacity of 380,000 kW, and an annual output of 600 million kWh, providing some 80 percent of the electricity for agricultural and rural industrial use, said an official of the provincial water resources and electric power bureau.

Over the past 5 years, the official said, small hydroelectric power stations increased at a rate of an annual installed capacity of 30,000 kW.

Also, the development of small hydroelectric power stations has promoted the development of the rural enterprises of the province, he said.

In the past 3 years, the provincial government has invested more than 96 million yuan in developing small hydroelectric power stations.

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CSO: 4010/31

HYDROPOWER

BRIEFS

TAIPINGWAN UPDATE--The No 3 power generating unit of Liaoning's Taipingwan power station which supplies power to the DPRK, was recently integrated into the power grid. It went into operation officially today after 72 hours of trial operation. The Taipingwan power station was jointly invested by China and Korea. It has four power generating units, of which Nos 3 and 4 supply power to Korea. After going into operation, the No 3 power generating unit will supply 200 million kWh of electricity to Korea annually. [Text] [Shenyang Liaoning Provincial Service in Mandarin 1030 GMT 26 Dec 86] /9604

HUNAN PUMPED-STORAGE STATION--China has researched, designed and equipped its first rural small-scale reversible pumped-storage hydropower station. The facility was recently completed in Lijiaya, Cili County, Hunan Province. This kind of hydropower station makes use of one set of equipment to both pump water and generate electricity. The equipment's pumping power is 450 kilowatts and its generating capacity is 320 kilowatts. [Text] [Beijing RENMIN RIBAO (OVERSEAS EDITION) in Chinese 9 Feb 87 p 1]

CSO: 4013/50

THERMAL POWER

FUJIAN TO GET ITS FIRST MODERN HARBOR POWER PLANT

Fujian FUJIAN RIBAO in Chinese 2 Sep 86 p 1

[Article by staff reporters Lu Xiuqin [7120 0208 0530], Zheng Xinggao [6774 5887 7559], and Zhang Lixing [1728 4409 1840]: "Opening Ceremonies Held at the Fuzhou Thermal Power Plant Yesterday--Fujian's First Large Modern Harbor Thermal Power Plant"]

[Excerpts] Opening ceremonies were held yesterday at the Chouqi Village work site in Changle County at the mouth of the Min Jiang for a key State construction project and Fujian's first large modern harbor thermal power plant, the Fuzhou thermal power plant. Provincial Party Secretary Chen Guangyi [7115 0342 3015] and Wang Defang [3076 1795 2455], general manager of the Huaneng International Power Development Company cut the ribbon and laid the foundation for the start of the project.

On the morning of 1 September, Officials from concerned provincial and city departments, guests from other provinces, and a combined representative group from Mitsubishi of Japan and more than 1,000 construction workers participated in the opening ceremonies.

The Fuzhou thermal power plant is a joint construction venture of the Huaneng International Electric Power Development Company and Fujian Province and is a key construction project in the country's Seventh Five-Year Plan. The planned installed capacity of this project is 1.4 million kW. the first phase involves two sets of 350,000 kW each and the generators and designs are being imported from Japan. After the initial project (700,000 kilowatts) is completed and in operation, 3.5 billion kWh of electricity will be supplied annually, comprising one-half of the present installed capacity of thermal power throughout the province.

Provincial Vice-Governor You Dexin [3266 1975 7451] spoke at the opening ceremonies. He said that the resolution by the Provincial Party Committee and the Provincial People's Government to construct the Fuzhou Thermal power plant is firm and unshakable and will ensure quality and quantity. According to the requirement of a reasonable time limit for the project, the Fuzhou thermal power plant is guaranteed to be completed and in production in 30 months, and with hard work, 27 months. For this reason, the Provincial Party Committee and the Provincial People's Government is requiring the leading organs of the

province, city and county and the concerned departments to take on the spirit of being the masters of their own affairs and to energetically care for, support, and participate in the construction of the Fuzhou Thermal power plant on their own initiative, giving priority guarantees in funds, materiel, technology, skilled personnel and other areas, and, at the same time, energetically providing convenience and support for the project on their own initiative and doing service work in all areas well. Construction units and design, building, and installation units must cooperate closely, ensuring engineering quality and building safety and also saving land usage as far as possible and saving investment to increase the project's economic benefit.

13310

CSO: 4013/0017

THERMAL POWER

'HUANENG' UNDERTAKING CONSTRUCTION OF BIG THERMAL PROJECTS

Fuzhou FUJIAN RIBAO in Chinese 2 Sep 86 p 1

[Article by Huang Zongkuan [7806 1350 1401]]

[Text] Approved by the State Council, the Huaneng International Power Development Company (abbreviated as "Huaneng" Company) was established in May 1985. This Sino-foreign joint venture is operated by the Huaneng Fine Coal Company, the China People's Construction Bank, the China Water and Power Foreign Trade Company, the Hong Kong China Construction Investment Company, and the Huaneng (Group) Limited and so on which have pooled funds and capital.

The tasks for which "Huaneng" is responsible are: importing complete sets of electric power equipment; constructing and operating power plants and related projects; receiving domestic representatives from each area and each department and its subsidiary enterprises as well as foreign companies or other economic organizations (or individuals), responsible for contacting and making links with them, and assist in reaching long-term or short-term agreements for electrical set-up loans or joint venture contracts; receiving representatives from foreign or domestic companies or other economic entities for investing funds to be used in China's power construction; integrating the aforementioned business affairs and organizing buy back trade.

"Huaneng"'s first group of construction projects are Fuzhou, Dalian, Shang'an, and Nontong, four coal-fired 700 MW power plants--and the Shantou 100 MW gas-fired steam plant. Altogether this amounts to 2.9 million kW, and, before the third quarter of 1989, they will all be completed. Altogether, the foreign negotiations for the imported equipment at the five power plants were completed in only a half year; this speed is unprecedented in importing for China's large power projects. During foreign negotiations and contract signing, according to its own function, "Huaneng" launches work with the spirit of reform, enhancing lateral contacts. It has broken the technology, pricing, loans, market trade and other practices separately completed by each department in the past and can integrate the functions of several departments. It will organically integrate technology and business, enhance negotiation progress and also enable the signed contracts to have even better comprehensive economic benefits.

"Huaneng" generally establishes subsidiary companies in the places in which it is constructing power plants.

THERMAL POWER

BRIEFS

MORE COAL-FIRED PLANTS--Beijing, 7 Jan (XINHUA)--China plans to build several large power plants in areas where the country's power shortage is the most acute, according to the Ministry of Water Resources and Electric Power. The new power plants will be built in Hubei, Liaoning, and Shanxi provinces. In addition, a number of coal-fueled power plants will be expanded. The new plant in central China's Hubei Province, which will begin soon, will be installed with two 300,000-kW generating units in the first phase of construction and ultimately it will have a generating capacity of 600,000 kW. Total costs are estimated at 740 million yuan. Two 200,000-kilowatt generating units will be added to the Liaoning power plant in northeast China's Liaoning Province, and the Zhangze power plant in Shanxi Province will add 840,000 kilowatts to its generating capacity in the second phase of its expansion project. All new generators will burn coal and construction plans have been approved by the State Council, China's highest governing body. [Text] [Beijing XINHUA in English 0251 GMT 7 Jan 87] /9604

CSO: 4010/25

COAL

COAL OUTPUT, EXPORTS REACH RECORD HIGH IN 1986

HK050241 Beijing CHINA DAILY in English 5 Jan 87 p 2

[Article by staff reporter Lui Dizhong: "China's Coal Exports Hit Record High, Earn \$39 Million"]

[Text] China's coal exports hit an all-time high last year as the industry, encouraged by the nation's flexible policies, expanded its overseas market.

According to figures newly released by the China National Coal Import and Export Corporation, China exported 9.85 million tons of coal in 1986, an increase of 30 percent over the previous year, or 9 percent higher than the planned target.

The exports have earned the State a total of \$397 million, up 27 percent on 1985.

Preparations are being made by the corporation to expand coal exports by an even bigger margin this year.

"We hope to export about 16 million tons of coal by the end of this year," Huang Shaochen, an official of the corporation, told CHINA DAILY.

Japan, the Democratic People's Republic of Korea and Hong Kong have been the major importers of Chinese coal. Japan alone imports about 4 million tons of coal from China every year.

Last year, Huang said, his corporation started exporting to Western European countries, including France, Holland, Denmark, Finland, West Germany, Belgium, and Italy.

The corporation has also found new buyers in other countries such as Turkey, Indonesia, Brazil, and Argentina.

To encourage coal exports, the State has stopped collecting tariff taxes on exported coal beginning January 1 this year.

Meanwhile, Huang said, construction of coal export bases is in full swing in 10 coal mining areas, including Datong in Shanxi Province, Kailuan in Hebei Province, and Zaozhuang in Shandong.

With the completion of these bases, he said, China's coal exports can be expected to reach 30 million tons by the end of 1990.

China's coal output has increased by an average of 60 million tons a year since 1983. Last year, the country mined more than 883 million tons, making it one of the world's biggest coal producers.

He said great efforts had been made by the country to improve the quality of exported coal and upgrade coal transport. More up-to-date coal washing and drilling equipment would be installed in the nation's major coal mines to ensure quality exports, he said.

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CSO: 4010/25

COAL

OUTPUT OF NORTHEAST, NEI MONGGOL AT ALL-TIME HIGH

OW160918 Beijing XINHUA in English 0817 GMT 16 Feb 87

[Text] Changchun, February 16 (XINHUA)--The output of the Coal Industry Corporation of Northeast China and the Inner Mongolia Autonomous Region topped 100 million tons in 1986, hitting an all-time high.

The corporation attributes the increase to the successful upgrading of technology and management of the mines under its jurisdiction.

Advanced excavation, hoisting and ventilation systems have been installed in several of the older mines.

In addition, coal washing, coal dressing, and loading and transportation equipment have been upgraded.

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CSO: 4010/34

COAL

DEVELOPING SHANXI'S MASSIVE COAL RESOURCES

Beijing LIAOWANG OVERSEAS EDITION in Chinese No 50, 15 Dec 86 pp 12-13

[Article by Shang Daijiang [1424 0108 3068]: "Mustering All Forces To Develop Shanxi's Coal"]

[Text] In 1985, raw coal output in Shanxi Province was 214 million tons and its proportion of raw coal output for the whole country rose from 19.5 percent in 1980 to 25.2 percent. By the year 2000, the State will require coal output from Shanxi Province to reach 440 million tons, that is, it will comprise 31 percent or more of the coal output for the whole country and the better part of three-fifths of the energy bases.

The Three Great Superiorities

The important position that the development of Shanxi Province's coal has, has been determined by the characteristic superiority of this province' coal resources.

Opening up the "Coal Distribution and Geological Data Map of Shanxi", people can see that there are coal reserve markings almost everywhere, from the plateaus north of the Yanmen Pass and the Great Wall to the vast expanse of fertile land along the banks of the Fen River and from the Taihang Mountains to the Luliang Mountains. Of the 105 counties (including cities and regions corresponding to county-level administrations) throughout the province, 94 have coal with the coal-bearing area reaching more than 57,000 square kilometers and comprising 37 percent of the total area of the province. The prospective coal reserves for the whole province is more than 800 billion tons and guaranteed reserves of more than 200 billion tons have already been proven.

If it is said that large reserves is one great advantage of Shanxi coal, then the complete range of grades and material excellence is yet another advantage. The coal fields in this province can be divided into three large coal type bases. The Datong and Ningwu coal fields in the north mainly have steam coal and long-flame coal and are excellent motive power coal bases. This coal is easy to burn, has strong gasified power with vigorous flame, and is suitable for the railroad and transportation industries and for coal gas, glass, non-ferrous processing and other industries. The Qinshui coal field in the southeast is Shanxi's largest coal field, hauling a coal-bearing area of more

than 29,000 square kilometers. Anthracite coal is predominant, and it is an important base for industrial chemicals and for coal used by the people. The heat stability of the anthracite coal here is high. It has great mechanical strength, and its lump coal can be substituted for coke and be put directly into boilers and converted to produce chemical fertilizer. The Xishan, Huoxi, and Hedong coal fields, situated on the banks of the Fen Jiang and in the Luliang Mountains, are one of the major bases for coking coal in China. The raw coal produced here is a fine grade of coking coal, being low in sulfur and ash content.

Deposit conditions are good, and, in the aspect of mining Shanxi coal, there are advantages. The geologic structure of the seams here is simple and the deposits are rather shallow; several of the coal fields can also be mined opencut. Thicknesses are medium thick to thick coal seam reserves from 1.3 to 8 meters, comprising 70 percent and more of the total reserves. The slope of the coal seams is gentle, generally at 5 to 10 degrees. In comparison with the many coal mines in other areas within China, to build mines of the same scale in Shanxi the investment is lower and the construction time is shorter.

The "Double-Linked" Road

For a long time, coal development in Shanxi Province has all along followed the path of Central Government investment and State management of mines. Due to investment restrictions, increased coal production was influenced; because the State ran the whole show, local enthusiasm was not able to be brought into play and the abundant local labor resources were also unable to be fully developed.

How does one change this lack of vitality? In recent years, Shanxi has explored a "double-linked" development road, that is, newly constructed mines and existing coal mines which have been renovated or expanded are linked to one another and developing large State-run coal mines and developing medium and small coal mines operated by localities and township and town collectives are linked to one another. A new pattern of fundraising from many different routes and development by many administrative levels is formed.

During the 6th FYP, a new force, the township and town mines in Shanxi Province, came to the fore, and the average annual output increased 22.8 percent. Their rate of increase is four and a half times that of mines under the State system. The proportion of the output from the township and town coal mines of the province's total output of coal rose from 25.5 percent in 1980 to 41.7 percent last year. They have already surpassed the 39.9 percent proportion of the mines under the State system. Now, medium and small coal mines operated by counties and by townships and towns have already become a pillar of the coal industry.

There have also been some new developments in the large system coal mines which are key State construction projects. In 5 years, new coal mining capacities increased 18.81 million tons. Presently, there are 14 key projects under construction, and, after these construction projects are finished, they will enable production capacities of the large State-run coal mines to increase 50 million tons and will lay the foundation for a steady increase in

the production for all of the coal bases in Shanxi. While constructing new mines, Shanxi will also carry out technological transformations of old mines which have good geological conditions, raise the level of mechanization and increase mining intensity. In 1980, the mechanization level of the State-run coal mines in Shanxi Province was only about 50 percent. Five years later, it reached 80 percent and more. Of these, "comprehensive mining" mechanization levels had reached more than 50 percent. According to calculations by the concerned departments, during the 6th FYP the coal output from the large State-run mines increased 18.22 tons, three-fourths of which was obtained through existing mines which had been expanded or had undergone technological transformation.

Incorporating Foreign Capital To Speed Up Development

Actively using foreign capital and importing foreign advanced technology and equipment is yet another way to speed up the development of Shanxi coal. In recent years, construction projects using foreign capital were:

- the Pingshuo Open-Pit Coal Mine, a Sino-U.S. joint venture. The design capacity is for an annual raw coal output of more than 15 million tons, and all the raw coal will be washed. Since excavation and stripping formally began 1 July last year, work progress has been going smoothly. It is estimated that [the mine] will go into production in July according to plan.
- three pairs of mines in the Gujiao Mining Region using a Japanese energy loan for construction. The annual design capacity is 8.5 million tons and construction work has completely begun. Of this, the Xiqu mine, with an annual output of 3 million tons, and the Zhenchengdi mine, with an annual output of 1.5 million tons, have already gone into production.
- the Changcun mine of the Cu'an Mining Affairs Bureau using a World Bank loan for construction. The annual design capacity is 4 million tons and work was formally begun on it last year. The Chengzhuang mine of the Pucheng Mining Affairs Bureau, with an annual design capacity of 4 million tons is listed as a key construction project in the State's 7th FYP.
- the Sitaigou mine of the Datong Mining Affairs Bureau using a Japanese energy loan for construction. The annual design capacity is 5 million tons and work formally began 2 years ago.

A high level official in the Shanxi government revealed that within the next fifteen years, according to the target of reaching 440 million tons of coal output in Shanxi Province by the end of this century, the whole province will need new increases in production capacity of more than 200 million tons. This kind of grand construction scale has never existed before. Because of this, it can be predicted that, along with the development of Shanxi coal construction, the utilization of foreign capital and the scale of importing advanced technology will continuously expand.

13310/12913

CSO: 4013/34

COAL

TURNING COAL INTO ELECTRICITY TO SUPPORT LOCAL INDUSTRY

Beijing LIAOWANG OVERSEAS EDITION in Chinese No 50, 15 Dec 86 p 15

[Article by Cui Jizhe [1508 3444 0772]: "Developing Industries by Converting Coal Locally"]

[Text] At the same time as having large-scale production and outbound transportation of energy, converting some of the energy locally and developing the high energy-consuming raw materials industries is presently a major task in the construction of energy bases in China. Its significance is multifaceted: it can both alleviate the pressure already on the over-strained transportation capacity and reduce the loss of energy during the course of outbound transportation; and, by making use of [local conversion], it can both change the distribution of the unreasonably high energy consuming industries and promote technological and economic advances within the limits of the bases, raising the standard of living of the local people.

Converting Coal to Electricity

To achieve the first step in the goals mentioned above, a group of coal-fired power plants are to be constructed, changing primary energy, coal, to secondary energy, electricity. According to the plan of relevant departments, by the end of this century, the installed capacity of thermal power plants in the energy bases will expand from the present 10 million kW to 35 million kW. In line with the principle of "nearby coal and local water", seven or eight large thermal power bases are to be constructed, and, while satisfying the bases' own needs, they will transmit electricity out to the North China, Central China, and Northwest Power Grids.

In order to achieve this plan, in the past 5 years, bases have speeded up the pace of construction. Newly installed capacity has increased 36 percent, and the amount of electricity generated has increased by about 14.5 billion kWh. The two large power plants of Datong and Shentou were built quickly and new installations added 1 million kW. Construction of new or expansion of large power plants, such as Yaomeng and Jiaozuo in Henan Province, Zhangze in Shanxi Province, Dawukou in Inner Mongolia, Qinling in Shaanxi Province, and so on, are in full swing.

In the 7th FYP, the bases will increase newly installed capacity by 4.45 million kW, of which newly installed capacity will increase by 2.45 million kW

in Shanxi Province, 300,000 kW in western Inner Mongolia, 1.2 million kW in western Henan, 200,000 kW in Shaanxi, and 300,000 kW in Ningxia. Aside from these State investment and construction projects, through the coordination of all sides, funds can be raised to undertake about 1.55 million kW of capacity. In this way, the total installed capacity will increase at a rate of 60 percent.

Developing the Metallurgical and Chemical Industries

Not only are energy bases richly endowed with coal resources, but other mineral resources are also very abundant; reserves of bauxite, rare earths, molybdenum, troilite, mirabilite and other minerals occupy a prominent position throughout China. These provide favorable conditions for the development of the high energy-consuming iron and steel, non-ferrous metal, coal-chemical engineering, and other raw materials industries.

In recent years, bases have begun carrying out technological transformation and expansion for the Taiyuan Iron and Steel Complex, the Baoshan Iron and Steel Complex, the Wuyang Iron and Steel Plant, other key State enterprises, and several mid-sized and small iron and steel mills for the purpose of raising quality, increasing output and varieties, lowering consumption, improving the environment, and raising economic benefits. Aside from these, several new mid-sized plants will be built at selected places along railroad lines serving coal export ports and at those with nearby coal, water, and supplementary materials, utilizing the empty cars returning from transporting coal to bring in fine iron ore for smelting. By the year 2000, the steel output of the bases will be about two times what it is now.

Key in the development of the non-ferrous metals industries in the energy bases is aluminum. In 1985, output of aluminum oxide from the bases made up about one-half that for the whole country. The main enterprises were the Zhengzhou Aluminum Plant in Henan, the Baotou Aluminum Plant in Inner Mongolia, the Qingtongxia Aluminum Plant in Ningxia, and several local mid-sized and small aluminum plants. In order to fully exploit the advantages of energy and aluminum resources in the bases, in the 15 years from 1985 to the end of this century, the aluminum industries in the bases will be greatly developed. It is predicted that, by 2000, production capacity of aluminum oxide in the bases will be about 8 times what it is now and production capacity of electrolytic aluminum will increase more than 10 times. In order to realize this goal, during the 7th FYP, several large aluminum plants, including a 1 million-ton aluminum oxide plant and a 100,000-ton plus electrolytic aluminum plant, will continue to be built or newly built in Hejin County, Shanxi Province, in Jiaozuo City, Henan Province, and in Weinan Prefecture, Shaanxi Province, on the basis of remaking or expanding existing plants. Recently, a large amount of bauxite resources have been discovered in the northwestern part of Shanxi Province; hopefully, this region will become a new base for a large-scale development of the aluminum industry at the end of this century and the beginning of the next.

A coal-derived synthetic ammonia plant under construction in Lucheng, Shanxi and a 100,000-ton mixed methanol plant planned for new construction are heralds for the coal-chemical industry being launched in the base. It is

understood that future chemical industry construction in the base will develop in these ways: with technical cooperation carried out by the Soviet Union, remake the Taiyuan chemical fertilizer plant which was built with their help during the First Five-Year Plan in the fifties; develop lateral relationships with coastal and other area, bring in funds and technology, and develop nearly a hundred small chemical products, of which the production capacity of calcium carbide can increase from 150,000 to 200,000 tons; continue to build or newly build several large chemical fertilizer plants in each of the provinces and regions; construct an integrated chemical industrial complex for calcium carbide, caustic soda, soda ash, and PVC in Wuhai City in Inner Mongolia; exploit the trona minerals in Henan and so on.

Develop the 'Three Small Villages' by Working Out Measures To Suit Local Conditions

What the "three small villages" refer to are small metallurgical, chemical or building materials enterprises run by collectives or individuals below the county level, e.g., small coking plant, small cement plant, small calcium carbide plant, small sulfur plant, and so on. These enterprises do not need State investment and can be set up by the rural people themselves. As for a "small three village" set-up, some coal can be converted locally, and large amounts of urgently needed metallurgical, chemical, and building materials can be supplied to the local area or nearby provinces and regions. At the same time, employment opportunities are provided for the surplus labor force of the rural villages and avenues are opened for the rural people to shake off poverty. The rather rapid development of the "three small villages" in Shanxi Province is an example. In recent years, this province has been guiding and fostering rural people according to the resources of the locale, working out measures suitable to local conditions, and developing the "three small villages" industries. Small blast furnaces begun and set up from funds collected by townships, towns, collectives and individuals throughout the province now number more than 500; the volume of the blast furnaces is more than 6000 cubic meters and the annual production capacity is more than 2 million tons. Last year, pig iron output reached about 1.5 million tons, making up one-third of the pig iron output from small blast furnaces in the whole country. There are more than 300 small blast furnaces that are still under construction or are being prepared for construction for a total volume of 4000 cubic meters. Presently, the "three small villages" industries set up by the masses are forming a complete system with the large numbers of township and town coal mines springing up. Already many forms have emerged and many different administrative levels have gotten together. The trend has been a gradual development from small to big and from local to foreign, becoming a vital new force in the raw materials industries throughout the province.

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CSO: 4013/34

COAL

STATE MINES SHOW INCREASED WORKER EFFICIENCY

OW260416 Beijing XINHUA Domestic Service in Chinese 0311 GMT 20 Jan 87

[Excerpts] Beijing, 20 Jan (XINHUA)--At the end of the first year of the 7th 5-Year Plan, China's state coal mines reached a conspicuous new level: With the rise of per capita productivity, coal production for each worker per shift broke the 1 metric ton mark for the first time, reaching 1.001 metric tons.

A comrade from the Ministry of Coal Industry told this reporter that the fact that coal mines under unified central planning broke the 1 metric ton mark in 1986 shows that we have made a major stride forward in fulfilling this goal which we have tried to fulfill for a long time. Of course, we must not be satisfied with this. The per capita output achieved by coal mines under unified central planning is indeed a big stride if compared with their past record, but the new record is far behind the world's advanced standard. The comrade from the Ministry of Coal Industry stressed that in order to achieve the goal of producing more than 1.2 billion metric tons of coal by the end of this century, China's coal mines, especially those under unified central planning, must modernize management, raise the standard of mechanization, and do a better job in increasing production and practicing economy.

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CSO: 4010/26

COAL

SHANXI OUTPUT HITS RECORD HIGH IN 1986

OW071216 Beijing XINHUA in English 1151 GMT 7 Feb 87

[Text] Taiyuan, February 7 (XINHUA)--Coal output in Shanxi Province, China's leading coal producer, reached a record 218 million tons in 1986, more than a quarter of China's total output.

Over the past seven years, the province's coal output has increased at an annual average rate of 10.4 percent or by 15.57 million tons, the provincial statistical bureau said today.

Of last year's total, 88.8 million tons were mined by 14 major state mines, and the rest by township-run mines which employ 300,000 peasant laborers.

In 1978, there were 1,000 township-run coal mines, and the number has increased to 6,000 thanks to the policy of encouraging peasants to go in for mining where deposits are more than enough for the state to exploit, office officials said.

Shanxi, which has coal reserves of 203.5 billion tons, or one-third of China's total, plans to boost output to anywhere between 360 million and 400 million tons by 2000.

To meet the goal, the province is opening more mines, including the Pinghsuo strip mine, a Sino-American joint venture expected to produce 15 million tons annually, and the Gujiao mine, which is using loans from Japan and is designed to produce 16.5 million tons of coking coal a year.

The state has increased allocations to the province in recent years to build new mines, update existing ones and better equip township-run mines.

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CSO: 4010/34

COAL

MINER'S AVERAGE OUTPUT NOW EXCEEDS ONE TON PER DAY

OW211002 Beijing XINHUA in English 0709 GMT 21 Jan 87

[Text] Beijing, 21 Jan (XINHUA)--Mechanization has enabled state-owned coal miners to produce an average of 1 ton per capita a day, PEOPLE'S DAILY reported today.

This is the first time that a miner at the mines under the Ministry of Coal Industry turned out so much coal last year, the paper says.

Coal mines in China used to employ an additional 80,000 to 100,000 miners a year to boost their production, according to the paper.

With implementation of contract job responsibility, the coal production output went up last year while the rank of miners was streamlined by reducing 151,000 miners.

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CSO: 4010/26

COAL

RIBBON CUT ON BIG TAIXI COAL DRESSING PLANT

Yinchuan NINGXIA RIBAO in Chinese 2 Sep p 1

[Article: "Ningxia's Key Project, the Taixi Coal-Washing Plant, Is Completed and Goes Into Production"]

[Text] At 11:30 in the morning of 1 September, amid the sound of applause and firecrackers, Li Xuezhi [2621 1331 2535], Party Secretary of the Autonomous Region, Li Yunhe [2621 1926 0735], Chairman of the Regional Political Consultative Committee, and Bi Kongsu [3968 1313 5091], Deputy Department Head of the Capital Construction Department of the Ministry of Coal, cut the ribbon on the completion and the beginning of operations of Ningxia's key project for the 6th FYP -- the Taixi coal-washing plant. Immediately, the red and green indicator lights in the computer control room in the main plant building lit up, several hundred machines started up, and "black gold" rolled out of the chutes.

That day, colorful flags were fluttering in the wind in the Taixi coal-washing plant area and, in a festive atmosphere, the Autonomous Region's leading comrades, Li Xuezhi, Li Yunhe, Hao Tingzao [6787 1694 5679], Liu Guofan [0491 0948 4636], Xu Qian [1776 5340], Ma Yingliang [7456 5391 0081], Wang Yanxin [3769 3601 9515], Liu Li [0491 0500], Anhui Provincial People's Congress Standing Committee Vice-Chairman Kang Zhijie [1660 1807 2638] as well as leading comrades from the State Planning Commission, the Ministry of Coal Industry, the China Coal Mine and Geology Trade Union, concerned departments in the Autonomous Region, and Shizuishan City had come here to participate in the large ceremony for the Taixi coal-washing plant starting operations and to congratulate yet another achievement in the Region's economic construction with the builders of the Taixi coal-washing plant and the whole plant's workers and staff enjoying the happiness of victory.

The Taixi coal-washing plant is the first anthracite coal washing plant in Ningxia and is designed to wash 2.1 million tons of raw coal per year. During construction and organization, the Ningxia Coal Capital Construction Company adhered to reforms, carrying out economic contracting and quality objectives responsibility systems and work completion target responsibility systems and developing many forms of labor competition. They utilized new technologies and new techniques, speeding up progress, guaranteeing quality and moving up the completion time 50 days. The good quality rate in the civil engineering

was 62 percent and the good quality rate in the installation work was 100 percent.

Liu Guofan, Deputy Secretary of the Autonomous Regional Party Committee, spoke at the ceremony. On behalf of the Autonomous Regional Party Committee and the People's Government, he expressed warm congratulations on the completion of construction and the start of operations of the Taixi coal-washing plant and paid tribute to those who participated in the construction of the Taixi coal-washing plant. He said that the completion of construction and the start of operations at the Taixi coal-washing plant is a major event in the development of the coal industry in Ningxia, and, in the changing the dominance of the coal resources to an economic one in Ningxia, it would raise the capability to generate foreign exchange and have a very important significance in developing coal's further processing and comprehensive utilization. He hoped that the comrades of the Taixi coal-washing plant would do well in each aspect of work after the start-up, setting up strong production command systems, strengthening management, relying on science and technology, tapping internal potential, and raising product quality so that the Taixi coal-washing plant would be a modern and civilized enterprise with good coal quality, generating lots of foreign exchange through exports and serving the steel and chemical industries.

After the ribbon-cutting ceremony was concluded, Li Xuezhi and other leading comrades enthusiastically visited the washing production system of the Taixi coal-washing plant inquiring about and acquainting themselves with the techniques and processes.

13310

CSO: 4013/17

COAL

IMPORTANCE OF TAIXI TO REGION'S ECONOMY REVIEWED

Yinchuan NINGXIA RIBAO in Chinese 2 Sep 86 p 1

[Text] One of the key projects of the 6th FYP in Ningxia, the Taixi coal-washing plant, has been completed and has gone into operation! It is a major event of strategic significance in the economic construction of Ningxia. On this occasion, we express our warm congratulations, and, to those builders who had the task of successfully completing this construction project, we give high respect!

Coal is a large, dominant resource in Ningxia, especially anthracite coal (that is, Taixi coal). Its excellent quality enjoys high reputation internationally. Fully exploiting this superiority holds a decisive position in the economic construction of Ningxia. On one hand, it will transform coal into electric power and will contribute to the development of the high energy consumption industries in Ningxia. On another, further processing and comprehensive utilization will be carried out on the coal itself and will enable Ningxia to change from a predominantly raw coal supplier to a predominantly fine coal supplier. It will improve the value of the coal and, from this, contribute to the development of carbon-based industries in Ningxia. Thus, it will greatly enhance the capability to generate foreign exchange through exports. The completion and start-up of the Taixi coal-washing plant has created favorable conditions in developing further processing and comprehensive utilization for on-the-spot conversion of Ningxia coal. It may be predicted that the completion and start-up of this new enterprise, by taking anthracite coal as the major raw coal material to do further processing and unite enterprise colonies, will suddenly appear on the land north of Yinchuan very quickly and become a vital force invigorating the economy of Ningxia.

Developing the strong points, shunning the weak points and exploiting what is dominant is an important principle of economic construction. The level of development in Ningxia's economy and society is rather backward. Transportation is especially impeded and is a prominent unfavorable factor restricting economic development in Ningxia. By relying on large amounts of raw materials being sold in other parts of the country, not only are the economic benefits lowered, it is also difficult for the transportation end to bear it. Because of this, we must go the route of doing further processing and doing on-site conversion of coal, and we must change the superiority of

the resources to an economic one. Here, there is a lot more that can be done, not only for coal but for other mineral resources and agricultural by-products. This is a formidable task facing each level of leadership and every department, including scientific and technical departments. A lot of investigation and study must be done on this and the dominant and subordinate positions of one's region and department must be analyzed completely. The strong points must be developed, the weak points avoided, and an accurate economic development strategy must be formulated. Through creative work, one's own dominant position must be amply exploited to make even greater strides in Ningxia's economic construction during the Seventh Five-Year Plan.

13310

CSO: 4013/17

COAL

MORE NEW OR RENOVATED MINES GOING INTO OPERATION

OW250906 Beijing XINHUA in English 0855 GMT 25 Dec 86

[Text] Beijing, 25 Dec (XINHUA)--A total of 23 newly built, renovated, or expanded coal mines across the country have gone into production and they have an aggregate annual production capacity of 17.61 million tons of coal, the Chinese Ministry of Coal Industry announced here today.

Among them are 13 large and medium-sized mines including the Zhenchengdi coal mine in the Gujiao mining area, with a designed annual production capacity of 4.5 million tons, the Yangquan No. 2 coal mine with an annual production capacity of 4.35 million tons, and the Duerping coal mine with an annual production capacity of 3 million tons. All three are in north China's Shanxi Province, the country's leading coal producer. They also include the Nanshan coal mine in the Hegang coal mining area in northeast China's Heilongjiang Province, which has a designed annual production capacity of 2.4 million tons.

Coal mines now under construction in China have a combined annual production capacity of 144 million tons, and 26 of them with a total production capacity of 26.17 million tons are scheduled to go into production in 1987. They include the Antaibao open-cut mine in the Pingshu mining area of Shanxi Province, a Sino-American co-operation project, which is to go into production next July.

According to the ministry, seven newly built, renovated, or expanded coal washing plants with a designed annual washing capacity of 11.55 million tons have gone into operation. China is now able to wash 140 million tons of coal a year.

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CSO: 4010/24

COAL

OVERHAUL OF TOWNSHIP MINING OPERATIONS PRODUCES RESULTS

Taiyuan SHANXI RIBAO in Chinese 1 Oct 86 p 1

[Article by Wang Xiaohong [3769 2556 4767]: "Results Seen in the Complete Reorganization of Township and Town Coal Mines in Shanxi"]

[Text] A complete reorganization of township and town coal mines throughout the province was begun in June of this year. At present, some preliminary results have been seen; output of raw coal has reached 51.39 million tons. This overhaul is being carried out in the spirit of the instructions by Premier Zhao Ziyang during his inspection of Shanxi. First, during the reorganization, 1,350 engineering and technical personnel and older workers were transferred from Datong, Xishan and six other large mining affairs bureaus to form safety and technical services teams. According to the "Method of Reorganizing Township Coal Mines in Shanxi Province" formulated by the provincial government, a general survey and registration of township and town coal mines was carried out and they were divided into categories. More than 20,000 problems of all kinds were examined, of which more than 15,000 have already been resolved or are in the process of being resolved. 4,300 chief and deputy mine managers have been trained and 19,000 skilled workers of all kinds have been trained. Second, government and business have been separated, and township and town coal mines have been gradually implementing a more business-type management. Most of the coal-producing counties and coal-producing townships throughout the province have set up coal administration bureaus and coal offices and have defined procedures and jurisdictions for the application and approval for appointing and dismissing township and town coal mine managers. According to the statistics from eight locales and cities, 2,192 mines have already carried out separation of political and professional responsibilities, more than 3,000 mines have appointed chief and deputy mine managers, and more than 3,000 mines have independently set up account books separate from the township or village financial affairs [offices]. These have given township and town coal mines stamina. Third is a vigorous overhaul of Category 3 mines. 1,318 Category 3 mines have stopped production and carried out reorganization and 122 privately opened mines were closed down to bring about a technological transformation of these mines according to standards and an improvement in safety conditions. In July and August, the death rate per million tons in the township and town coal mines throughout the province dropped 61 percent from that of the first half of the year.

13310/12913

CSO: 4013/19

COAL

DESPITE GAINS, MAJOR WASTAGE OF COAL STILL IN EVIDENCE

HK091020 Beijing RENMIN RIBAO in Chinese 7 Feb 87 p 2

[Commentary by staff reporter Liu Xieyang [0941 3610 7122]]

[Text] Coal departments in China have made good achievements in saving coal over the last 2 years, with an annual saving of 700,000 tons. However, there is still great potential to tap in this respect.

Coal mines are the main energy producing departments but are large energy consumers as well. Statistics from the development concerned suggest that the coal mines under unified national arrangements consume about 10 million tons of coal a year, equivalent to the annual output of a large coal mine. Widespread waste has been observed in the use of gas and electricity in these coal mines as well as in the personal use of coal by employees of these mines.

To economize on coal, it is necessary to correct the wrong practice of using coal without a plan. Over the last 2 years, there has been an increase in China's coal production and market supply. But coal falls far short of supply in some regions. According to a detailed calculation, with a 5 percent decrease in the use of coal in the coal mines under unified national distribution about 700,000 tons of coal can be saved per year, equivalent to the annual output of a medium-sized coal mine. The construction of a medium-sized coal mine usually requires an investment of 100 million yuan over 5 to 6 years.

To economize on coal, it is also necessary to practice good management. In the past, there was a large waste of coal as a result of using coal without a plan or limits. There has been a change for the better over the last 2 years. But due to lax management, the practice of everybody eating from the same big pot can still be seen in some coal mines in terms of the distribution and use of coal. To change this situation, the energy contract system should be popularized and improved for the purpose of encouraging those who economize on coal and educating those who fail to do so. There was major waste in the use of coal in the Pingdingshan Mine Bureau in Henan Province. In 1981, it began to implement the economic responsibility system in the use of coal by rewarding those who save and penalizing those who waste coal. This saved 370,000 tons of coal in 3 years, which amounted to 8 million yuan. The lesson is worth learning.

An important link in economizing on coal is to properly carry out technical reform and to bring about technological progress. Some years ago, many coal departments reformed their outmoded, high-consuming furnaces. This produced good results. One hundred thirty-six centralized heat supply projects have so far been built in mining areas in the country, 483 individual furnaces have been dismantled, and 615 low-efficiency furnaces have been replaced, thereby forming a coal saving capacity of 540,000 tons. Moreover, a number of low-efficiency furnaces have been reformed, raising their heat efficiency by 30 percent and reducing environmental pollution in these mining areas.

An important way to economize on coal is to make full use of fuel with a low calorific value. There are now about 1 billion tons of gangue in reserve in various coal mines throughout the country, and about 100 million tons of gangue are produced every year. Gangue with a heat value of 8000 kilocalories accounts for a large percentage. In the past, such gangue was stock piled in mining areas and wasted. Gangue is now being used in power generating stations, and 12 such stations have so far been built, with an installed capacity of 160,000 kilowatts. The coal mines under unified national arrangements now have 600 boiling furnaces, and a large amount of gangue has been utilized. Therefore, people in coal mines in the northeastern and eastern regions of China are advised to use low-quality coal so that good coal can be used for better purposes.

Every place of work in coal mines is painstaking. Coal miners have the glorious tradition of hard struggle and being thrifty and frugal. Better results will be achieved in the work of saving on coal so long as leaders in coal mines pay attention to the economical use of coal, rely on the masses, and exercise stricter management.

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CS0: 4013/45

COAL

BRIEFS

INDUSTRY CUTS PERSONNEL, UPS OUTPUT--China's coal mines operating under the Ministry of Coal Industry have increased output, despite personnel reductions resulting from organizational streamlining since 1984. Compared with 1983, in 1986 these mines saw a total reduction of 400,000 personnel, while coal output increased 48 million metric tons. [Summary] [Beijing Domestic Service in Mandarin 1030 GMT 5 Feb 87 OW] /9738

NEW HEILONGJIANG MINE COMPLETED--Construction of a modern mine (annual capacity: 900,000 tons) of the Qitaihe Coal Mining Administration, Heilongjiang, has been completed 1 year ahead of schedule. A ribbon-cutting ceremony was held for its opening today. Construction of the shafts began on 1 November 1983. The state's total investment was 130 million yuan. The shafts have total reserves of 120 million tons, and a production life of 60 years. As a key project covered by the state's Seventh Five-Year Plan, the colliery was the first modern one with vertical shafts designed and constructed by the Qitaihe Coal Mining Administration. Through more than 3 years of strenuous construction, a pair of vertical shafts with an annual capacity of 900,000 tons, and three large mechanized mining areas had been built by early December. As assessed by experts of the Ministry of Coal Industry, the quality of the vertical shafts reached the designed standards. [Text] [Harbin Heilongjiang Provincial Service in Mandarin 1000 GMT 15 Dec 86] /9604

YANGQUAN DRESSING PLANT COMPLETED -- A coal dressing plant capable of washing 4.5 million tons of raw coal a year formally went into production on 15 December [1986] at the No. 1 mine of the Yangquan Mining Bureau. The No. 1 mine dressing plant, an expansion project approved by the State Planning Commission, boosts output from the original 1.5 million tons of raw coal a year to 4.5 million tons. Using technology of the eighties, the facility creates less pollution and is capable of producing fine lump coal of 30mm diameter or larger. [Excerpts] [Beijing ZHONGGUO METAL BAO in Chinese 20 Dec 86 p 1]

CSO: 4013/50

OIL AND GAS

PETROLEUM INDUSTRY OUTLINES DEVELOPMENT PLANS

OW171636 Beijing XINHUA in English 1440 GMT 17 Feb 87

[Summary] Beijing, 17 Feb (XINHUA)--The Chinese petroleum industry ministry will aid the country's poor areas by raising 2.5 billion yuan (U.S. \$676 million) in developmental funds, a ministry official said today.

The areas to receive aid include underdeveloped regions in the Xinjiang, Ningxia, Guangxi, Inner Mongolia and Tibet autonomous regions, and parts of Shaanxi, Gansu, Qinghai, and Hubei provinces. "Oil and natural gas reserves have been discovered in these areas," the official said, adding that the ministry has decided on three projects during the 1986-90 period to speed oil and natural gas development to help these areas achieve prosperity.

One project in Zepu, southern Xinjiang, will consist of a refinery, a factory to produce 10,000 tons of liquified petroleum gas annually, and a chemical fertilizer plant scheduled to manufacture 130,000 tons of synthetic ammonia and urea a year. "When completed over the next 3 years," the official said, "the new facilities will help ease the strain on oil transport from northern Xinjiang to the southern parts of the region, and alleviate local fuel shortages."

Over the next 3 years, the ministry will also construct the Duosikule oil field, designed to pump 8.4 million barrels a year, and a refinery with an annual production capacity of 7 million barrels at Golmud, Qinghai Province, with a pipeline linking the two points. Upon completion, the facilities will make it possible to supply fuel for motor vehicles and aircraft with locally refined fuel.

A third project will involve the Alshan oil field scheduled to pump 7 million barrels annually, a refinery with the same capacity and pipeline in Inner Mongolia.

"The ministry plans to intensify oil and natural gas exploration in Yan'an Prefecture, Shaanxi Province, and Beise Prefecture in the Guangxi Zhuang Autonomous Region. Workers will also be sent to Tibet to help develop and utilize that region's geothermal resources."

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CSO: 4010/33

OIL AND GAS

ADVANCES IN OIL EXPLORATION, PRODUCTION CITED

OW290836 Beijing XINHUA in English 0633 GMT 29 Dec 86

[Text] Jinan, 29 Dec (XINHUA)--China will step up oil products production to ease the present serious shortage which is expected to become more acute in the next few years, said State Councillor Kang Shien.

He told participants at the on-going meeting of oil administration directors that there must be a big development in oil production in the next few years through the end of this century.

He said that recent progress in the exploration of oil and natural gas resources has boosted the confidence in achieving the goal for the end of this century so that the needs of economic construction will be fully met.

He listed the following progress in China's oil industry:

--China's largest oil producer, Daqing oil field, has made a breakthrough in the flow-limiting fracture technology that makes it possible to extract oil from the seemingly impossible thin oil layers;

--Shengli oil field, China's second largest, has broken new ground in the exploration and development of multi-layer oil reserves;

--Liaohe oil field has reported a sizable geological oil reserve;

--Dagang oil field in Tianjin has verified a rich oil and gas reserve near the sea.

--large deep reserves of natural gas have been discovered along the banks of the [Huang He] and thick oil reserves at shallow depth have been verified at Miyang depression in Henan;

--in northwest China's Xinjiang, large oil-bearing strata have been reported in the eastern part of the Junggar Basin;

--high-yielding oil wells have been drilled in the western part of the Qaidam Basin in Qinghai Province;

--the Huabei oil field has obtained a sizable oil reserve in the Erenhot Basin in Inner Mongolia;

--in Sichuan, a big reserve of porous natural gas stratum has been reported extending from the eastern part of the province to the southern part.

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CSO: 4010/24

OIL AND GAS

KANG SHIEN HAILS BREAKTHROUGHS IN OIL, GAS EXPLORATION

OWO61140 Beijing XINHUA in English 1117 GMT 6 Jan 87

[Excerpts] Beijing, 6 January (XINHUA)---Two major breakthroughs were made in China's oil exploration work in the past few years, State Councilor Kang Shien announced here today.

Addressing managers and plant directors of the China Petrochemical Corporation attending an ongoing conference, Kang explained the two breakthroughs:

One of them was that by using limited-volume fracturing technology, Daqing oil field made use of thin oil-bearing layers which were thought to have no industrial exploration value and thus enabled itself to maintain the 10-year-old annual production quota of 350 million bbl for a longer period.

The other breakthrough was that the Shengli oil field, the country's second largest, has the prospect of becoming a second Daqing and its development has provided a reliable basis for larger-scale exploration in the Bohai Gulf.

In addition, there were also 10 major discoveries:

The Liaohe oil field is developing an impressive oil reserve in the Damintun depression and Xixiepo;

The Dagang oil field is developing nearly 1.4 billion bbl of oil deposits in coastal areas in southern Tangshan and has found a compound oil-gas reservoir covering a considerable area to the south of Kongdian;

The Zhongyuan oil field has discovered a large area of deep layer gas on both sides of the [Huang He] and a new oil-gas reservoir in Puyang;

The Henan oil field is developing thick oil resources in the Jinglou area;

The Xinjiang oil field has detected an oil-bearing area on a considerable scale in the eastern Junggar Basin;

The Qinghai oil field has put into production a new highly productive oil well in the western Qaidam Basin.

The Huabei oil field is developing about 700 million bbl of oil resources in the Eren Basin of the Inner Mongolia Autonomous Region, and good prospects have appeared in the Beijing-Tianjin depression;

The Sichuan gas field has found a large gas-bearing layer in the eastern part of the province;

Three new oil-bearing formations have been found in the Liaodong Gulf;

A large gas field with a reserve of more than 90 billion cubic meters has been explored in the Yingge Sea, and some oil-gas blocks have been found in the Huizhou depression in the South China Sea.

The state councilor pointed out, "these major discoveries show that there are rich oil and gas resources in the country's eastern and western regions and the continental shelf."

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OIL CORPORATION REPORTS 1986 OFFSHORE PRODUCTION

OW111329 Beijing XINHUA in English 1254 GMT 11 Feb 87

[Text] Beijing, 11 Feb (XINHUA)--China produced 375,000 tons of offshore oil last year, 281,000 tons more than in 1985, China National Offshore Oil Corporation announced here today.

Of this, 168,000 tons were pumped out by Chengbei oil field, 160,000 tons by Weizhou oil field and 47,000 tons by the No 8 platform in Bohai.

Production in Section B of the Sino-Japanese cooperative Chengbei oil field is growing steadily. Construction of Section A of the oil field has already been completed and will go into production in the second quarter of this year. The field is expected to turn out 300,000 tons of crude this year.

The Wei 10-3 field in the South China Sea has withstood several typhoons since it went into trial operation last August. It is also expected to produce 300,000 tons of crude this year.

Two platforms have been erected and five wells drilled at the 28-1 field in the Sino-Japanese cooperative zone in Bohai.

Two exploratory wells were sunk by Chinese companies last year at the Ya 13-1 gas field in the Yingge Sea. Construction of the upper and lower reaches of the gas field has been stepped up.

It will also be decided whether to develop the Xijiang 24-3, 24-1 oil fields, the Huizhou 21-1 oil field this year.

Since China began to seek foreign help in developing its offshore oil in 1979, a total of U.S.\$480 million has been spent on exploitation, of which 230 million was invested by foreign companies and 240 million by Chinese partners.

According to the National Oil Corporation, 10 major oil and gas discoveries were made in offshore areas in 1986, more than in each of the last few years. A total of U.S.\$310 million and 230 million Chinese yuan were invested in exploration.

Over the past few years, 320,000 kilometers of seismic lines were shot and 141 wells sunk offshore and 54 wells have reported oil or gas discoveries.

In the past 6 years, U.S.\$1.94 billion and nearly 400 million yuan were used for offshore prospecting and another U.S.\$480 million for development.

In 1986, the Chengbei oil field exported 61,800 tons of oil to Japan and the Weizhou oil field exported 160,000 tons.

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NEW DISCOVERIES COULD BE BOON TO SICHUAN GAS INDUSTRY

OW081138 Beijing XINHUA in English 1119 GMT 8 Feb 87

[Text] Beijing, 8 Feb (XINHUA)--New discoveries by Chinese gas prospectors point to promising gas reserves in southwestern and northern China, according to the overseas edition of PEOPLE'S DAILY.

Large concentrations of gas-containing structures have been located in Sichuan Province. Geologists say these new discoveries will revitalize this country's largest natural gas supplier.

Several gas wells of industrial value have been drilled in the Shaanxi-Gansu-Ningxia basin in northern China, where coal abounds. These wells are within a short distance of each other. Promising structures have been found in an area of up to 10,000 square kilometers in the region.

Last year, some 20 gas wells were drilled in the Songhuajing-Liaohe basin in northeast China, where Daqing oil field is situated. These wells point to the existence of a large oil and gas production base in the area, experts predict.

Geologists say that China will speed up the exploration of natural gas in these areas.

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CSO: 4010/32

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MORE NATURAL GAS EXTRACTED FROM COAL MINES

OW240931 Beijing XINHUA in English 0836 GMT 24 Feb 87

[Text] Beijing, 24 Feb (XINHUA)--Last year, China extracted 340 million cubic meters of harmful natural gas from state-owned coal mines, and 70 percent was utilized, according to CHINA COAL INDUSTRY JOURNAL.

China has over 280 billion cubic meters of natural gas reserves in state-owned coal mines, of which 28 to 43 billion cubic meters can be extracted.

During the Sixth Five-Year Plan (1981-85), China extracted 1.59 billion cubic meters of natural gas, and hopes to increase the annual figure to 400 million cubic meters by 1990.

Natural gas extraction began in 1950, and extraction systems in 108 mines are now complete. An additional 88 mines will also be tapped because of their high estimated reserves.

The natural gas industry is working out new techniques to make impure gas more useful as industrial fuel and as a raw material for the chemical industry.

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LIAOHE TO SEE MAJOR CONSTRUCTION EFFORT IN 1987

HK011033 Hong Kong ZHONGGUO XINWEN SHE in Chinese 0301 GMT 31 Dec 86

[Text] Jinan, 31 Dec (ZHONGGUO XINWEN SHE)--This year the annual oil output of the Liaohe oil field in northeast China has exceeded 10 million tons and the daily output has reached 29,750 tons. This oil field has become China's third largest oilfield.

The annual oil output of the Liaohe oil field in 1985 was 9 million tons, lower than the Huabei oil field, formerly the third largest field.

This news was disclosed at a recent work conference of the Ministry of Petroleum Industry.

The Liaohe oil field is a compound oil field consisting of various kinds of oil and gas deposits. It has been verified that there are rich reserves of oil in the Damingtun area and the inclined zone in the west of Liaohe. This has laid the foundation for the Liaohe oil field to continuously maintain its title of being China's third largest oil field.

Wang Tao, minister of petroleum industry, said that the Damingtun area will become one of the areas of key construction projects for China's petroleum industry in 1987.

It has been reported that the Liaohe oil field has plans to produce 11.4 million tons of oil and 1.3 billion cubic meters of gas in 1987.

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NEW WELLS BOOST SHENGLI OUTPUT TO RECORD HIGH

HK090733 Hong Kong ZHONGGUO XINWEN SHE in Chinese 1307 GMT 7 Jan 87

[Report: "Shandong's Shengli Oil Field Produced Nearly 30 Million Tons of Crude Oil in 1986"]

[Text] Jinan, 7 Jan (ZHONGGUO XINWEN SHE)--The Shengli oil field in Shandong Province has increased its production output by a big margin in successive years. In 1986, it raised the total output of crude oil to 29.5 million tons, an increase of 2.47 million tons over 1985. The margin of increase was the largest among various oil fields throughout the country.

In 1986, the Shengli oil field concentrated its manpower and material and financial resources on development work in the Gudong, Qinghe, and Caoqiao oil fields and others. In a period of 9 months or so, more than 900 oil wells in the Gudong oil field went into operation, with an initial production capacity of 5 million tons. They produced 3.2 million tons of crude oil in the same year.

The Shengli oil field has persisted in giving first priority to the work of exploring new oil fields. In 1986, there were three more large oil-bearing zones, and the three oil-producing zones were considerably expanded. The amount of oil geological reserves that had been found and put under control increased to hundreds of million tons.

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CSO: 4013/46

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NATURAL GAS DISTRIBUTION, EXPLOITATION PROSPECTS DISCUSSED

Chengdu TIANRANQI GONGYE [NATURAL GAS INDUSTRY] in Chinese No 3, 28 Sep 86
pp 1-4

[Article by Luo Zhetan [5012 5832 3389], Chengdu Geology College: "A View of the Exploitation Prospects of China's Natural Gas Resources"--first paragraph is article summary; received for publication 2 Aug 85]

[Text] This article starts out from the current situation of the ill-matched development trends in China's energy resource structure with that of the world's energy resource structure and discusses the distribution of China's natural gas resources and the prospects for their exploitation. It is held that, whether one looks at strata sequences or at a region, China's natural gas resources are distributed broadly. There are two broad categories of gas pools, normal and non-normal, and there are eight kinds of non-normal gas pools, of which many kinds are found in China. It is forecasted that China's natural gas industry will develop vigorously.

Natural gas is a major component of the world's normal energy resources, and, along with petroleum, coal and shale, is referred to as a bio-fossil energy source. Natural gas, oil and coal are the three great pillars of energy sources for modern industry, and in total consumption of the world's energy sources, natural gas comprises 19 percent, coal comprises 27 percent and oil comprises 42 percent. Presently, of the composition of China's energy sources consumed, oil comprises 18 percent and natural gas only comprises 2 percent. This situation is very ill-matched with the development trends in the world's energy resource structure. However, provided we combine the special characteristics of China's abundant natural gas resources and seriously begin work, the exploitation prospects of China's natural gas resources is certainly very optimistic.

The Distribution of China's Natural Gas Resources

Natural gas has been discovered from the Quaternary Period to the Early Sinian Period in China and there are many strata sequences from the Quaternary to the Later Paleozoic Group yielding natural gas pools. Gas pools have also been discovered in mixed granite and ancient crusts of weathering in the Sinian and Early Sinian periods. The main gas-generating rocks of the gas pools in the Later Triassic and Quaternary are continental facies series and the main gas-storing rock is sandstone. As for gas pools in the mid-Triassic series to the Sinian Period, marine facies are the main gas-generating rock and the main gas-storing rock is carbonatite.

The distribution in China of natural gas in the epi-tectonic strata of the Quaternary is very widespread, especially so on the banks of the Chang Jiang and in the areas along the coast. However, because the thicknesses of the strata are not large and there are no large areas of stable distribution and their weakness from structural deformities is great, generally only rather small, lens-shaped, shallowly buried (about 8 to 40 m) gas-bearing sand bodies are able to form reserves. Of these, the best can be extracted on a small-scale and used on the spot, such as in Shanghai, Zhejiang and other places.

However, for the Quaternary natural gas in the Qaidam Basin, this is not so. The scale of the gas is large and the production from a single well in the gas field is high. For example, the thicknesses of the Quaternary deposits in the eastern part of the basin are large, the area of its remnant thickness greater than 1,000 m is 29,000 km², the depth of the base may reach 3,200 m, and the maximum thickness may reach 2,700 m.

Natural gas pools have been discovered in China's Later and Early Tertiary Period, and quite a few of them, such as the Taiwan Basin, the Bohai Bay Basin and the Tarim Basin, are condensated gas pools. Gas production is dominant in the Taiwan Basin, and, of the 14 oil and gas fields discovered [there], 6 are pure gas fields. The gas pools of the Tertiary Period of the Bohai Bay Basin are rather numerous, and, in regard to the groupings of the gas bodies, it is the most complex of the gas-bearing basins. Aside from the gas pools which are generally dominant in hydrocarbon gases, there are hydrogen sulfide gas pools (Zhaolanzhuang) and carbon dioxide gas pools (Binsi Gas Pools). In the Northern Jiangsu Basin and the Sanshui Basin of Guangdong, several Tertiary gas pools, including carbon dioxide gas pools, were also discovered.

Cretaceous Period gas pools are found in the Songliao Basin, most of them in sandstone beds and extremely few of them in carbonatite beds. In the Quantou formation of the Wanjinta structure, volcano-formed gas pools containing carbon dioxide as high as 97 percent were also discovered.

Jurassic Period gas pools are principally found in the Da'anzhai formation in the Sichuan Basin and are generally anticline condensated gas pools. In the Jurassic coal series at the Yingcheng Coal Mine in Jilin and at the Yaojie Coal Mine in Gansu, sudden ventings of gas, mainly carbon dioxide, have occurred. They were probably shallow gas pools which had been damaged.

The Triassic Period is one of the major distribution layers for China's condensated gas pools and condensated oil and gas pools. They mainly appear in marine facies strata and some also in continental facies strata. The Sichuan Basin has a large quantity of Triassic Period gas pools. Vertically, there are 13 gas-bearing layers, of which marine facies carbonatite comprise 11. The primary gas pools of the Xujiahe formation (Xiangxi Group) of the Upper Triassic series are mainly developed in northwest Sichuan and in the middle of Sichuan and are mainly wet gas. Secondary gas pools are only rarely

found in eastern Sichuan and southern Sichuan and their sizes are rather small. Their gas sources have come through faults from underlying strata and are dry gas. Gas pools have been discovered in the Leikoupo, Jialingjiang and Feixianguan formations of the Middle and Lower Triassic Series. There are especially many in the Jialingjiang formation. The reservoir bed is carbonatite. In the southern Sichuan region, there is mainly fissure-pore gas storage, of which the #1 and #2 sections of the Jialingjiang formation and the #5 section of the eastern Sichuan region are mainly gas storage in pores. Gas pools in the Feixianguan formation is closely related with fissures.

Gas pools have been found in the Yangxin series, the Changxing formation and in the Shanxi-Shihezi formation of the Permian Period. The gas pools in the Yangxin series in the Sichuan Basin is one of the present main gas producing layers in China. The reservoir bed is carbonatite and has fissure-pore gas storage and ancient rock dissolved crusts of weathering gas storage. The deepest gas bed discovered at present in China (7,153.5-7,175m) is in the Yangxin series; bioherm gas pools are continually found in the Changxing formation.

Gas pools in the Huanglong formation of the Carboniferous Period have been found in succession in the Xiangguosi gas field in the eastern section of the Sichuan Basin and in other gas fields. The reservoir bed is dolomite and the fissure-pore type [gas storage] is dominant. Horizontally, the pores are distributed rather steadily and the porosity and the permeability is generally better than the Permian and Triassic carbonatite reservoir beds. The gas is generally carbonatite's weathering crust of ancient Karst.

Gas pools of the Upper Series of the Sinian Period appear in the Sichuan Basin. These are gas pools in the oldest deposited strata which have been discovered at present in China. In the granite of the Early Sinian Period of the Weiyuan gas field in the Sichuan Basin, very small amounts of gas have been obtained. In the granite of the central bulge in the Songliao Basin, fairly good gas shows were found in several wells, of which the Zhaoshen #1 well obtained 4123m³/d of gas after acidation. These gas [shows] probably have something to do with the ancient weathered crusts of rock. Ancient weathered crusts of original rock is a target worth paying attention to in oil and gas exploration. Abroad, there are many examples of these kind of oil and gas fields, and the Renqiu oil field in North China is of this type. Because of this, looking for gas fields in the ancient weathered crusts ought to be given ample attention.

The stratigraphical distribution characteristics of China's natural gas resources and those of the world are as shown in Table 1:

Table 1

Strata	Proven Natural Gas Reserves (%)	
	World	China
Quaternary	/	3.60
Tertiary	10.31	21.75
Cretaceous	47.91	2.22
Jurassic	6.25	0.35
Triassic	7.52	30.71
Permian	23.68	20.21
Carboniferous	2.03	4.91
Devonian	1.12	/
Silurian	/	/
Ordovician	0.96	/
Cambrian	0.04	/
Sinian	/	16.25

Note: The proven natural gas reserves of Taiwan Province are not listed.

Looking at Table 1, the reasons why the reserves of natural gas in China's Triassic Period and Tertiary Period occupy the first two places is, on the one hand, related to the degree of exploration and, on the other hand, is mainly related to the period of rather strong coal accumulation. The periods of strongest coal accumulation in China were in the Late Carboniferous-Early Permian, Late Permian, Early-to-Middle Jurassic, and Late Jurassic-Early Cretaceous. Because of this, it can be expected that, in the future, even more natural gas reserves will be discovered in China in the Jurassic and Permian Periods. Of these reserves, special attention must be paid in carrying out natural gas exploration in the two strata periods in the Sichuan, Ordos, Qinshui, Tarim, Junggar, Erlian and other basins.

China's natural gas reserves are not only broadly distributed in the strata, the distribution is also very broad in geographical position. Gas fields which have already been proven are mainly distributed in Sichuan and secondarily in Taiwan, Qinghai, Guizhou, Hubei, Henan and Hebei. In recent years, oil and gas exploration has taken place on the continental shelf offshore and it has borne out that the distribution of natural gas in the offshore seas has great potential. For example, the South China Sea, the East China Sea and the South Yellow Sea illustrate that the territory for gas exploration in China is very broad.

The Exploitation Prospects of China's Natural Gas Reserves

China is now launching a second round of a general oil and gas surveys, and opening up new domains, new regions, new types and new depths of the oil and gas resources is the nucleus of our work. In the exploitation of natural gas and the development of these "four new aims," even more glorious prospects will undoubtedly come about.

Natural gas resources are often divided into two types: normal natural gas and non-normal natural gas. The aforementioned natural gas distributed in China is basically normal gas and it is the type for which great efforts must be made to explore, exploit, and utilize first. However, the other geological reserves of the non-normal gas resources are much more than those of normal gas. Under normal conditions, a more complex technology is required for their exploration and exploitation and the capital costs are higher. Only under given techno-economic conditions can an industrial-type exploitation be carried out.

Non-normal gas can, on the whole, be divided into eight types: compact sandstone gas, shale gas, coal measure gas, ground pressure gas, typhonic gas, deep basin gas, low-pressure water-dissolved gas, and hydrated gas. Many of these are in China.

Compact sandstone gas is the non-normal gas source in which great efforts in exploration and exploitation are presently being made abroad. The porosity of this type of sandstone is 3 to 12 percent and its permeability is 0.0001×10^{-4} to 10×10^{-4} square microns, which is 0.05 to 20 percent of the permeability of reservoir rock for normal gas. To explore and exploit this type of gas, super-large fracturing, nuclear explosion technology and other measures are presently used often abroad. The potential of this type of gas resource in China is very large, and, basically, work has not yet begun in this new area. Natural gas has been encountered in drilling in the compact Devonian Wutong sandstone in southern Jiangsu, and, recently, there have been a small number of wells able to carry out industrial production. There are large areas of this type of sandstone in the Jiangsu-Zhejiang-Anhui area.

Shale gas is similar in its rock type, lithofacies and terreau type to biogas source rock and is more or less distributed parallel to sea (or lake) shorelines. Similar shale has been seen in previous explorations in China, and, in the future, study and exploration in this area must be intensified.

Coal measure gas is natural gas produced by the decomposition of coal through heating, and the natural gas adsorbed per ton of coal may vary from 0.0001 to 20 m³. China has very abundant coal resources, and the proven coal reserves to a depth of 1,000 meters reach 640 billion tons. Thus, exploring for coal measure gas in basins containing coal measures and gas fields formed by coal measure gas dispersed to upper traps is a positive measure for expanding natural gas resources. By vigorously beginning studies on coal-generated gas, China believes that it can reap rich fruits in the not-too-distant future.

Ground-pressure gas is a gas of high-pressure exceeding normal static pressure and which is dissolved in water in the strata and is an aqueous gas. It is dominant in geothermal resources, and the natural gas is a supplemental dual resource. The Beijing-Tianjin region in China is a geothermal resource area that is worth noticing.

Typhonic gas is a gas which comes from deep within the earth. One type is methane and hydrogen continually released by the mantle during its evolutionary processes and is called mantle gas. Another type is hydrogen gas made from the decomposition of water under very high ground temperatures and is called geothermal hydrogen. When hydrogen gas rises to near the earth's surface, it may undergo bacteriological action and change into methane. Typhonic gas ought to be looked for on both sides of large, deep faults and fissures and in regions of basaltic magma activity.

Deep basin gas is a natural gas resource found in the axial portion of syncline basins on the fringes of cratons. The major difference between this gas and other gas reserves is the transposition of the water-gas relationship. The natural gas reservoir is in the rather low positions and slopes of strata, and water is in the upper positions and slopes. In the middle there is a gas-water transition belt. The water brings about a sealing action, and, for this reason, [these reserves] are also called water-sealed gas reserves. This type of gas reserve is often found in deep hollows of syncline basins and there are often huge reserves, thus they are named deep basin gas or deep basin gas traps. Actually, deep basin gas is not so deep; generally, there are gas-bearing strata from 1,000 to 4,000 meters. Breakthroughs in deep basin gas categories in North America is a contemporary development in petrogeology. In China, the Sichuan, Ordos, Junggar, Turfan, Tarim and other basins have the necessary basic conditions for deep basin gas, and, because of this, it is possible to find deep basin gas in these basins.

Carbon dioxide gas reserves are a special non-hydrocarbon type gas reserve. Carbon dioxide gas has an ever higher economic value than hydrocarbon type gas bodies. In the exploration and exploitation of oil, carbon dioxide has broad uses. For example, it is used in acidation, fracturing, oil driving to increase the rate of recovery, and so on. Carbon dioxide is often accompanied with hydrocarbon-type gas bodies and its formation generally has an important relationship to the production and movement of oil and gas. Also, high purity (99.55 percent) carbon dioxide gas reserves are often found. During the course of the general oil and gas survey and exploration in China's Sanshui Basin in Guangdong, Jiyang Depression in North China, Songliao Basin, the Northern Jiangsu, North China, Jiang-Han, Sichuan, Ordos and other basins, quite a few gas reserves and gas wells with high amounts of carbon dioxide were discovered one after another. There ought to be a special review and study of this, and, in the future, these special gas reserves should also be consciously searched for and explored.

As discussed and explained above, both normal and non-normal natural gas reserves in China have a large development potential, and, integrating the development trends of the world's energy resource structure, China should make the exploration and exploitation of natural gas an important matter of work in the petroleum industry. China cannot merely keep on developing the petroleum and giving consideration to the natural gas industry to the point that oil is favored over gas. This will cause the development of the natural gas industry to fall far behind the needs of economic construction. This [situation] is not suited to the potential of the abundant natural gas resources in China.

We know that the development of the natural gas industry has been stressed in recent years in the world. This shows the inseparability of the superiority of natural gas and its abundance, and is an inexorable trend in the development of normal oil and gas energy resources. As predicted by European energy resource experts, by 1990, European natural gas reserves will exceed oil reserves and, by 2000, natural gas will have been substituted for oil and will be Europe's chief energy resource. In the 1981-1985 plan in the Soviet Union, natural gas was stressed, and the proportion of natural gas in the plan's energy resource consumption was to rise from 20 percent in 1980 to 32 percent in 1985. The minister of the Soviet Ministry of the Gas Industry asserted that by 1990 the amount of natural gas extracted in the Soviet Union would rise to 835 to 850 billion cubic meters. Aside from making great efforts to develop normal natural gas, the United States is also paying great attention to non-normal gas resources, especially the compact sandstone gas and Devonian shale gas for which a large amount of research has already begun. By 2000, it is estimated that compact sandstone gas will comprise 14 percent of America's energy resource needs. In the past, Mexico regarded the problem of natural gas utilization as a burden, but now Mexico has decided to use even more natural gas domestically in order to guarantee greater exports of crude oil and petroleum products. In addition, they will also implement a very important energy resource policy, stipulating that before gas-handling facilities are constructed in oil fields, the oil fields cannot go into production. In this way, a lot of the gas waste in oil fields is avoided and production of the accompanying gas in oil fields is increased.

Faced with the challenge of a new technological revolution in the world, China will come out with appropriate countermeasures in all areas. Fortunately, measures have already been vigorously adopted with regard to opening up and developing the natural gas industry in China. Minister Wang Tao of the Ministry of Petroleum Industry has said, "We definitely must stress crude oil and natural gas equally, enabling natural gas to be coordinated and developed with crude oil." It is believed that in the not-too-distant future a flourishing natural gas industry will appear. Speaking from the present exploration and exploitation of natural gas in Sichuan, since 1979, the Sichuan Petroleum Administration Bureau has made acquiring more reserves its major objective and making the Carboniferous Period in Eastern Sichuan the focal point, feasibly intensifying geological reserves and scientific research, greatly popularizing new techniques and new technologies and enabling the exploration and production of natural gas to enter new stages of development. For more than 4 years, newly-found geological reserves in the eastern Sichuan region are 119 percent of the proven reserves of the past 23 years and natural gas output has increased at a rate of 20 percent every year, becoming a major natural gas production base for all of Sichuan. There were also new discoveries in the second exploration of southern Sichuan and southwestern Sichuan and new gas wells and gas reserves were acquired. Sichuan's natural gas reserves are quite abundant and more than half of the structures which have already been discovered have not been drilled. None of the deep gas reserves have been opened up. The exploration prospects are very extensive. At the 27th World Geological Congress, oil and gas geology experts from the Soviet Union and the United States placed great hopes on exploring and exploiting natural gas in strata at depths of 7,000 meters or more. Therefore, we should pay attention to gas exploration at these new depths in Sichuan as well as throughout China.

Presently, China is undergoing an upsurge in natural gas exploration, and in Sichuan, the Central Plains, north China, the northwest, or the northeast, new and good news about natural gas exploration will continually pour forth. In the South China Sea, we can confirm from geological and exploration data already obtained, that China's largest natural gas reservoir is probably in the South China Sea, especially in the Yingge Sea. The long-range prospects for natural gas in the East China Sea are also very gratifying. We believe that the exploitation and utilization of China's natural gas resources is bound to be magnificent and that we will add a new chapter to the development of China's oil industry.

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NATIONAL NATURAL GAS SYMPOSIUM CONVENES

Chengdu TIANRANQI GONGYE [NATURAL GAS INDUSTRY] in Chinese No 3, 28 Sep 86
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[Article: "Welcoming a Springtime in China's Natural Gas Development--State Planning Commission Convenes Third National Symposium on Natural Gas Exploration and Exploitation"]

[Text] The Third National Symposium on Natural Gas Exploration and Exploitation directed and convened by the State Planning Commission lasted 6 days and ended in Xinxiang, Henan on 28 August; 150 representatives and leading comrades, specialists and professors from the State Planning Commission, the State Science and Technology Commission, the State Council's Economic, Technological, and Social Development Center, the concerned academies and institutes of the Chinese Academy of Sciences, the China Energy Research Committee, PEOPLE'S DAILY, ECONOMIC DAILY, the Ministry of Petroleum Industry the Ministry of Geology and Mineral Resources, the Ministry of Coal Industry as well as other concerned academies, schools and units gathered together and discussed the important matter of speeding up China's natural gas exploration and exploitation.

During the 6th FYP, the state convened two such national professional meetings and made rapid progress and achieved gratifying results in regard to raising the level of understanding about developing China's natural gas industry. We began to tackle the key scientific and technological problems, to explore for gas formed from coal and enlarge the exploration territory. A group of newly-discovered natural gas fields has provided new natural resources for the national economic reconstruction, from the continent to the oceans, in different types of deposits and basins or of different geologic ages or caused by different kinds of formation.

In developing natural gas resources, the natural resource is of foremost importance. Not only does China have abundantly overripe gas and oil-type gas resources, it also has been richly endowed by nature with coal-formed gas resources. According to preliminary evaluations and calculations, the amount of coal-formed gas alone is more than 10 trillion cubic meters. At the same time, China is also a large coal-producing country, and in the exploiting of the coal, methane gas in the coal seams amounting to billions of cubic meters can be supplied and taken out. Broad prospects have already emerged for its comprehensive utilization. In addition, biogas, aqueous gas, and other very conventional gas pools also await our exploitation.

The exploitation of China's natural gas has been longstanding and well-established, and China may be said to be the world's birthplace for natural gas. However, China is also an energy country in the midst of development. Compared with large energy countries in the world, in energy composition, the proportion comprised of oil and gas is less than one-fourth and the proportion of natural gas is even lower. The amount of natural gas produced is only one-tenth of the amount of petroleum produced, and this is not at all suited to the amount of natural gas resources in China. It is also not suited to the needs of the rate of development of the national economy. To change this backward energy situation, the pressing need of the country is developing natural gas exploration and exploitation. It also has a very important strategic importance.

All sorts of achievements and experiences concerning natural gas exploration and exploitation were widely exchanged at the meeting and understanding of natural gas became more profound and more scientific. At the meeting, it was pointed out that in order to achieve a sustained and steady increase in the national economy, the exploitation and construction of natural gas and other energy industries must continue to be strengthened and great efforts must be made to increase energy reserves and production as well as energy savings. It was held that if a professional contingent engaged in the exploration, exploitation, extraction and transportation, refining, processing, and utilization of natural gas as well as scientific research, and if other units in key natural gas exploration areas such as Sichuan, the Central Plains, Bohai Bay, Shaanxi-Gansu-Ningxia [Basin], the Songliao [Depression], the Tarim [Basin], the South China Sea, and the East China Sea would lay equal stress on oil and gas and explore for petroleum and natural gas with advanced equipment and continue to regulate the investment proportion and price of natural gas, and if it would coordinate the work of the Ministry of Petroleum, the Ministry of Geology and Mineral Resources, and the Ministry of Coal Industry, implement reforms and rely on scientific and technological progress, then the development of China's natural gas industry will be speeded up.

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CSO: 4013/10

OIL AND GAS

SOUTH CHINA SEA OIL SEARCH BRINGS MIXED RESULTS

HK180349 Hong Kong SOUTH CHINA MORNING POST (BUSINESS POST) in English
18 Dec 86 p 10

[Report by Olivia Sin]

[Excerpts] China National Offshore Oil Corp (CNOOC) spent more than U.S.\$2 billion on its search for oil along the country's coast between 1980 and last year.

About a quarter of the money, or \$549.7 million, was spent last year alone, according to the company's 1985 annual report.

The results of those costly efforts to find offshore oil have been mixed.

While scores of dry wells were reported in the South China Sea, discoveries have been numerous.

The latter include two marginal fields now being developed, a gigantic natural gas field south of Hainan island, and four encouraging oil discoveries in the Pearl River estuary.

But the economics of the company's plans for oil and gas production have been clouded by languishing oil prices.

As reported earlier, the Hainan gas project has been delayed, and it appears that development of the four Pearl River discoveries is also likely to be postponed.

Doubts have also been expressed about the profitability of the marginal fields in Beibu Gulf and Bohai.

The low level of exploration and development activities in Chinese waters has undoubtedly detracted from the earnings of CNOOC's subsidiaries specializing in offshore oil services.

Though the annual report did not indicate any deterioration of CNOOC's financial situation, analysts said this year's report should provide a clear picture.

Officials from Nanhai West Oil Corp, a unit of CNOOC, have admitted in private that the company has diversified into non-oil activities such as trading to boost income.

With registered capital of 6 billion yuan (about HK\$12.6 billion), CNOOC's paid-up capital at the end of last year was 1.89 billion yuan.

The report said CNOOC had surplus funds of 1.21 billion yuan, of which 921 million was earmarked for equipment renewal and technical renovation. The remainder was split between production and repair expenditure.

But part of this spending is expected to be recouped through the sale of oil from the Beibu field, which started gushing four months ago.

The report said CNOOC spent \$2.41 million on gas exploration in Yinggehai basin, off Hainan Island.

The field was discovered jointly with Atlantic Richfield. It is understood that CNOOC spent more than \$30 million on sinking two appraisal wells in the field earlier this year.

The report showed that CNOOC spent \$141.4 million on the Chengbei oil field in Bohai, near Shanghai. Part of that field, jointly developed with Japanese concerns, started producing last year.

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CSO: 4010/24

OIL AND GAS

EXPLORATION TO CONCENTRATE ON EASTERN AREAS

OWO71846 Beijing XINHUA in English 1441 GMT 7 Jan 87

[Text] Beijing, 7 January (XINHUA)--China will concentrate its oil exploration efforts in China's eastern areas during the Seventh 5-Year Plan ending in 1990, said a senior geologist from the Ministry of Petroleum Industry today.

According to Chief Geologist Yan Dunshi, work will continue to develop 26 oil pools already found in the areas encompassing parts of northeast, north, and east China.

These are where China's major oil fields, such as Daqing, are located. The oil fields there furnish 92.8 percent of China's annual crude oil output--910 million bbl for last year--and 86.5 percent of China's verified oil and gas reserves, Yan said.

New oil bearing zones have also been found in areas from Bohai Bay to the middle and lower reaches of the [Chang Jiang] he added.

One is a 13,000 square km area in Bohai Bay's shallow sea and beaches, where oil and gas reserves have been verified in five section totaling 6,000 square kilometers.

The chief geologist said China will also step up exploration for oil and gas reserves in western areas of China.

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CSO: 4010/27

OIL AND GAS

OUTLOOK FOR OIL, GAS PROSPECTS IN LIAODONG GULF SAID GOOD

OW130956 Beijing XINHUA in English 0656 GMT 13 Jan 87

[Text] Beijing, 13 Jan (XINHUA)--Chinese experts predict that the Liaodong Gulf of the Bohai Sea in northern China may hold important oil and gas reserves.

All eight wells drilled in the area by the Bohai Petroleum Co. in the last 2 years struck oil and gas, seven of which are high-output wells of high grade oil. The first successful well drilled in the area in 1984 pumps out 500,000 cubic meters of gas and 1.61 million barrels of crude a day, according to the company.

The surrounding areas of the new oil field also have promising geological structures which might result in a cluster of oil fields in the area, said experts.

The Bohai Petroleum Co. has also drilled some prospect wells in the Liaodong Gulf which have come up with important discoveries, according to the company.

The petroleum company has obtained loans from the World Bank and is using the capital in further prospecting and evaluation, according to the company.

The company expects to start development of the oil field next year.

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CSO: 4010/31

OIL AND GAS

BRIEFS

OIL STRIKE IN ZHOUKOU BASIN--Beijing, 11 Feb (XINHUA)--Geologists have discovered oil in the Zhoukou basin between Henan and Anhui Provinces, according to CHINA GEOLOGY. The state has designated the basin as one of seven key areas for oil and natural gas exploration during the Seventh Five-Year Plan (1986-1990). Four rigs from the Henan oil field began drilling in the basin last year and struck oil before the traditional Spring Festival on 29 January. [Text] [Beijing XINHUA in English 1520 GMT 11 Feb 87 OW] /9738

SHANDONG OUTPUT GROWS--Shengli Oil Field in Shandong Province has made marked oil production progress over the past 3 years and scored a more than 10-million-ton increase in crude oil output each year. At the end of 1986, the daily output of the oil field reached 93,000 tons and broke the 50,000-ton record scored before the 3-year period. The oil field turned out more than 29.5 million tons of crude oil, a more than 10-million-ton increase over the 1983 figure. [Excerpts] [Jinan Shandong Provincial Service in Mandarin 2300 GMT 9 Jan 87 SK] /12858

OIL EXPORTS NOT TO INCREASE--Beijing, 2 Jan (XINHUA)--China will not increase its total volume of oil exports this year to help stabilize the oil prices on the world market, announced a Chinese official here today. Zheng Dunxun, president of the China National Chemicals Import and Export Corporation, said the move is designed to help the Organization of Petroleum Exporting Countries (OPEC) in its effort to stabilize world oil prices in the hope of a price increase to a reasonable level. China has always helped OPEC stabilize the price of oil, he said, adding: "China greatly reduced its oil exports in 1986." Zheng expressed his appreciation for the positive results made by OPEC in its 80th session of minister-level meetings held recently. During the 10-day meeting, they reached agreement on further reduction of oil production and resuming the fixed price system. [Text] [Beijing XINHUA in English 0912 GMT 2 Jan 87] /9604

NEW EXTRACTION TECHNOLOGY--Jinan, 21 Dec (XINHUA)--China has developed a new technology to extract 20-centimeter-thin oil layers which lay 1,000 meters underground, said State Councilor Kang Shien today. "The flow-limiting fracture technology will bring the total oil reserve of Daqing up to 7 billion barrels," said Kang Shien at a national meeting on oil sinking which opened Saturday at Shengli in east China's Shandong Province. Previously, China was incapable of exploiting thin oil layers. "The new oil drilling technology is of significance to China's oil industry as a whole." It is expected to ensure that Daqing maintains the present annual production of 350 million barrels of oil for another 10 years." [Text] [Beijing XINHUA in English 0905 GMT 21 Dec 86 OW] /7358

NEW KARAMAY PIPELINE--Beijing, 8 Jan (XINHUA)--A 28-kilometer-long oil pipeline has been put into use in the Karamay oil field in the Xinjiang Uygur Autonomous Region, northwest China. The pipeline, with an annual delivery capacity of 7 million bbl from the oil field to a refinery, will save 5.6 million yuan a year and recoup its capital outlay in 18 months of operation. [Text] [Beijing XINHUA in English 1112 GMT 8 Jan 87 OW] /9599

CSO: 4010/31

NUCLEAR POWER

MNI TO BECOME 'SECOND ENERGY MINISTRY'

Beijing RENMIN RIBAO in Chinese 8 Feb 87 p 1

[Summary] In the first year of the Seventh Five-Year Plan, the Ministry of Nuclear Industry's [MNI] military production was greatly reduced while the output of civilian products leaped by 33.2 percent. Minister Jiang Xinxiong himself cited these figures, underscoring the fact that the ministry continues to readjust its production structure, doing everything in its power to expand the civilian product line so that during the Seventh Five-Year Plan, in line with government requirements to become the "second energy ministry," it can properly handle the peaceful application of atomic power [nuclear energy].

In a working meeting held on 7 February, Jiang Xinxiong reviewed the path followed by MNI over the previous 3 years to develop civilian products. MNI has already developed more than 1,000 types of products. The value of these civilian products has increased from 80 million yuan to 370,000 million yuan. The development of nuclear power is the major direction of MNI in its civilian endeavors. By the end of 1986, more than 44 meters of the Qinshan nuclear power plant's containment shell had been filled with concrete, and this task should be completed in the first half of 1987. Already, 348 of 393 necessary research items have been completed. Rapid progress has also been made at the Daya Bay nuclear power plant, where ground has been broken on the nuclear island. Jiang Xinxiong also pointed out that China has a potentially large market for isotope applications and radiation processing.

CSO: 4013/50

SUPPLEMENTAL SOURCES

NORTH MAY SEE MAJOR USE OF GEOTHERMAL ENERGY

OW131128 Beijing XINHUA in English 0720 GMT 13 Jan 87

[Text] Tianjin, 13 Jan (XINHUA)--Some 130,000 square kilometers of north China contains geothermal energy resources, according to Cai Yiham, director of the Tianjin University Geothermal Energy Research Center.

Altogether, 830 geothermal wells can be sunk, Professor Cai said. Only 20 in Hebei Province, Beijing, and Tianjin are now in operation for heating greenhouses and fish ponds, and other industrial uses.

According to Professor Cai, north China has been listed as a major area for using geothermal energy by the Chinese government, which has allocated a sum of 3 million yuan for geothermal research between 1986 and 1990.

Last week, 120 experts gathered in Cangzhou Prefecture, Hebei Province, to share the experience in developing geothermal energy resources. In particular, they stressed the need for adequate surveys and anti-pollution safeguards.

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CSO: 4010/31

SUPPLEMENTAL SOURCES

USE OF WIND POWER GROWS IN RURAL AREAS

OW190926 Beijing XINHUA in English 0652 GMT 19 Jan 87

[Text] Beijing, 19 January (XINHUA)--Some 10,000 wind-driven power generators with capacities ranging from 100 to 2,000 kW are operational in China, indicating that wind power utilization in the country is no longer in the trial stage.

According to today's PEOPLE'S DAILY, these generators are installed mainly in pastoral and rural areas and on islands far away from the major power grids.

In Inner Mongolia, 8,600 wind generators are servicing 10,000 families.

On Pingtan Island off the Fujian coast, a Sino-Belgium wind power generating plant with a capacity of 800 kilowatts was completed last November and provides energy needed by the island's fishery.

Wind energy utilization has a great potential in China's northwest and northeast and on the Qinghai-Tibetan plateau, the paper said.

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CSO: 4010/27

SUPPLEMENTAL SOURCES

BRIEFS

MORE WINDMILLS BEING PRODUCED--Beijing, 14 Feb (XINHUA)--China produced 20,000 wind-driven power generators in 1986, 53 percent more than in the previous year, according to CHINA FARM MACHINERY NEWS. This brought the total number of wind-power generators to 35,000 in China. They are found in 13 provinces and autonomous regions, but Inner Mongolia possesses 71 percent. Seven models of power generators produced in China have capacities of between 50 to 2,000 Watts, suitable for remote rural areas, coastal islands, and border posts. Last year, China also developed wind-power water-lifting machines to serve agriculture. [Text] [Beijing XINHUA in English 0706 GMT 14 Feb 87 OW] /9738

CSO: 4010/33

CONSERVATION

CONSERVATION EFFORTS HELP BOOST NATIONAL INCOME

OW010734 Beijing XINHUA in English 0728 GMT 1 Feb 87

[Text] Beijing, 1 Feb (XINHUA)--In the past 5 years, China has saved 240 million tons of coal, PEOPLE'S DAILY reported today.

During the 1981-85 period, China created 180 billion yuan (48.6 billion U.S. dollars) in output value and increased its national income by 80 billion yuan (21.6 billion U.S. dollars), just through energy conservation, the paper said.

Energy consumption in some industries is still high, the report said, adding that in 1985, the fixed energy consumption per ton of steel was 1.68 tons of coal, 65 percent higher than in Japan.

According to the report, China will continue its energy-saving policy during the Seventh Five-Year Plan period (1986-1990), and hopes to save 150 million tons of coal in 1990 over the 1985 figure.

Statistics show, last year alone, China saved 30 million tons of coal, and energy consumption for every 100 million yuan (27 million U.S. dollars) in industrial output value dropped 30 percent against 1980's figures, the newspaper added.

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CSO: 4010/29

CONSERVATION

LIAONING HEAVY INDUSTRY SAVES ENERGY, INCREASES OUTPUT VALUE

OW151058 Beijing XINHUA in English 0858 GMT 15 Feb 87

[Text] Shenyang, February 15 (XINHUA)--Energy-consuming industries in northeast China's Liaoning Province have reportedly conserved 2.53 million tons of coal in 1986.

There are 398 energy-consuming enterprises in the province, which consume 80 percent of the total energy products. Thanks to tight control and a reward and punishment policy in energy consumption, these enterprises lowered the energy consumption for every 10,000 yuan worth of production value by 4.36 percent while their production value increased by 5.37 percent over the previous year.

Liaoning is a heavy industrial center and every year it consumes electricity, coal, and petroleum equivalent to more than 90 million tons of coal or about one-tenth of the country's total energy consumption.

The province began to revise its energy policy on three occasions from 1983 and classified its factories into three categories, with those conserving the largest amount of energy heavily rewarded and those doing little to conserve energy severely punished by reducing their bonuses.

The policy has stimulated enterprises to renovate their technology to lower energy consumption level. The Shenyang No. 4 rubber plant invested 850,000 yuan in energy conservation projects, which helped raise its energy utility rate 1.5 times higher than similar enterprises in other parts of the country. Last year alone, the plant derived more than 400,000 yuan income from its energy conservation efforts.

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